156-202

TRANSCRIPT OF RECORD.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1894.

No. 155.

THE NATIONAL CASH REGISTER COMPANY, APPELLANT,

vs.

THE BOSTON CASH INDICATOR AND RECORDER COMPANY AND JAMES H. WRIGHT, PRESIDENT.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF MASSACHUSETTS.

FILED MAY 7, 1894.

(14,626.)

(14,626.)

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1894.

No. 155.

THE NATIONAL CASH REGISTER COMPANY, APPELLANT,

vs.

THE BOSTON CASH INDICATOR AND RECORDER COMPANY AND JAMES H. WRIGHT, PRESIDENT.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF MASSACHUSETTS.

INDEX.

	Original.	Print.
Caption	1	1
Bill of complaint as amended	2	1
Answer	6	5
Replication	8	8
Hearing	9	8
Final decree	9	8
Claim and allowance of appeal	10	9
Evidence for complainant	11	9
Deposition of James W. See	11	9
Evidence for defendants	28	21
Deposition of Nathaniel Hill	28	21
Jerome J. Webster	35	26

JUDD & DETWEILER, PRINTERS, WASHINGTON, D. C. AUGUST 24, 1894.

	Original.	Print
Deposition of James Shepard	55	42
Evidence for complainant in reply	79	59
Deposition of Henry B. Renwick	79	59
Further evidence for defendants	90	71
Deposition of James Shepard	90	71
Further evidence for complainant	120	80
Deposition of Frank J. Patterson	120	80
Henry B. Renwick	128	96
Defendants' Exhibit Pottin Patent—English patent No. 2076, granted Henry Pottin May 28, 1877	137	102
Complainant's Exhibit Russell Patent—Letters patent No. —, granted James Russell October 10, 1829	111	107
Complainant's Exhibit Ritty and Birch Patent—Letters patent No. 271,363, granted James Ritty and John Birch, assignors to Jacob H. Eckert, January 30, 1883	151	109
Defendants' Exhibit Campbell Patent—Letters patent No. 253,506, granted Michael Campbell February 14, 1882	161	115
Defendants' Exhibit Hardy Patent—Letters patent No. 231,165, granted Joseph N. Hardy August 17, 1880	171	119
Defendants' Exhibit Deming Patent—Letters patent No. 176,518, granted Philander Deming April 25, 1876	177	125
Defendants' Exhibit Sholes and Glidden Patent—Letters patent No. 200,351, granted C. L. Sholes and Carlos Glidden, assignors to The Typewriter Company, February 12, 1878	181	127
Defendants' Exhibit Allen Patent—Letters patent No. 185,711, granted Robert T. P. Allen December 26, 1876	187	131
Defendants' Exhibit Capron Patent—Letters patent No. 110,547, granted Jacob Capron December 27, 1870	193	131
Defendants' Exhibit Plumb Patent—Letters patent No. 256,591, granted Fawcett Plumb April 18, 1882	199	136
Defendants' Exhibit Forrester Patent—Letters patent No. 249,606, granted Peter C. Forrester November 15, 1881	205	139
Defendants' Exhibit Borland and Hoffmann Patent—Letters patent No. 205,993, granted William P. Borland and Herman Hoffmann July 16, 1878	211	143
Defendants' Exhibit Howie Patent—Letters patent No. 185,537, granted Mathew Howie December 19, 1876	215	146
Defendants' Exhibit Windmuller and Ahrens Patent—Letters patent No. 217,063, granted John Windmuller and Frederick Ahrens July 15, 1879	221	149
Complainant's Exhibit Maltby Patent 318,485—Letters patent No. 318,485, granted Clinton H. Maltby, assignor to the National Manufacturing Company, May 26, 1885	227	152
Complainant's Exhibit Maltby Patent 321,988—Letters patent No. 321,988, granted Clinton H. Maltby, assignor to the National Cash Register Company, July 14, 1885	233	158
Complainant's Exhibit Patterson Patent 351,460—Letters patent No. 351,460, granted Frank J. Patterson, Isaac P. Davis, and Al. Herrman, assignors to the National Cash Register Company, October 26, 1886	239	161
Complainant's Exhibit Patterson Patent 382,552—Letters patent No. 382,552, granted John H. Patterson May 8, 1888	249	165

	Original.	Print.
Complainant's Exhibit Heady and Patterson Patent 384,158—Letters patent No. 384,158, granted John F. Heady and John H. Patterson, assignors to the National Cash Register Company, June 5, 1888	265	176
Complainant's Exhibit Heady and Patterson Patent No. 386,401—Letters patent No. 386,401, granted John F. Heady and John H. Patterson, assignors of the National Cash Register Company, July 17, 1888	285	184
Opinion of the court	303	215
Clerk's certificate	313	221

1 UNITED STATES OF AMERICA, *Massachusetts District*, } *ss*:

At a circuit court of the United States for the first circuit, begun and holden at Boston, within and for the district of Massachusetts, on Wednesday, the fifteenth day of October, in the year of our Lord one thousand eight hundred and ninety, before the Honorable Le Baron B. Colt, circuit judge.

NATIONAL CASH REGISTER COMPANY, Complainant,
v.
BOSTON CASH INDICATOR AND RECORDER COMPANY *et al.*, Defendants. } In Equity.

The bill of complaint in this cause was filed in the clerk's office on the eighteenth day of June, A. D. 1887, and was duly entered at the May term of this court, A. D. 1887. On the twenty-eighth day of said June, before any copy of the same had been taken out of the clerk's office, the complainant amended said bill, which bill as amended is in the words and figures following:

2 *Bill of Complaint as Amended.*

(Filed June 18, 1887, amended June 28, 1887.)

To the honorable the judges of the circuit court of the United States for the district of Massachusetts:

The National Cash Register Company, a corporation organized and existing under and by virtue of the laws of the State of Ohio, and having its principal place of business at Dayton in said State, and a citizen of said State, brings this bill against the Boston Cash Indicator and Recorder Company, a corporation organized and existing under and by virtue of the laws of the State of Maine, but doing business in the State of Massachusetts, and having its principal office and place of business at Boston in said State of Massachusetts, and James H. Wright, president of the said Boston Cash Indicator and Recorder Company, and a citizen of the State of Massachusetts, residing at Boston in said State.

And thereupon your orator complains and says that heretofore and before the thirtieth day of January, 1883, James Ritty and John Birch were the original, first and joint inventors of a certain new and useful improvement in cash registers and indicators, not
2*a* known or used before their said invention, and not in public use or on sale for more than two years prior to their application for letters patent therefor.

And your orator further shows unto your honors that the said James Ritty and John Birch, being as aforesaid the original, first and joint inventors of said improvement, and being citizens of the United States, made application to the Commissioner of Patents for letters patent, in accordance with the then existing acts of Congress,

and by an instrument in writing, duly recorded in the Patent Office of the United States, sold, assigned and transferred to one Jacob H. Eckert, his heirs and assigns, all the right, title and interest in and to said invention and improvement, and in and to the application for letters patent therefor; and having in all respects duly complied with the conditions and requisitions of said acts, on the thirtieth day of January, 1883, letters patent of the United States, No. 271,363, signed, sealed and executed in due form of law, for the said invention and improvement, were issued to the said Jacob H. Eckert, his heirs and assigns, as the assignee of the said James Ritty and John Birch, whereby there was secured to the said Jacob H. Eckert, his heirs, executors, administrators and assigns, for the term of seventeen years from the thirtieth day of January, 1883, the full and exclusive right of making, using and vending to others to be used, the said invention and improvement, which said letters patent are now of record in the Patent Office of the United States.

And your orator further shows unto your honors that afterwards, by an instrument in writing duly recorded in the Patent Office of the United States, the said Jacob H. Eckert sold, assigned and transferred the entire right, title and interest in and to said invention and improvement, and in and to said letters patent No. 271,363, to the National Manufacturing Company, a corporation organized and existing under and by virtue of the laws of the State of Ohio, and having its principal place of business at Dayton, in Montgomery county, in said State, whereby the said National Manufacturing Company became and was the sole and exclusive owner of the entire right, title and interest in and to said invention and improvement, and in and to said letters patent No. 271,363.

3 And your orator further shows unto your honors that being as aforesaid the owner of the entire right, title and interest in and to said invention and improvement, and in and to said letters patent No. 271,363, the said National Manufacturing Company, under sects. 5855, 5856 and 5857 of the Revised Statutes of the State of Ohio, authorizing such procedure, by its board of directors did, on the twenty-fifth day of November, 1884, duly file a petition in the court of common pleas of Montgomery county, Ohio, in which county its principal office was located, praying for a change of name of said corporation to the National Cash Register Company; and the court being satisfied that the due notice by publication had been given of the object and prayer of said petitioners, and upon good cause shown, did, on Dec. 26, 1884, order such change of name as prayed for; that a copy of said order of said court was, on Dec. 27, 1884, filed with the secretary of state of the State of Ohio, where the articles of incorporation of said company had been filed, and a copy of said order was duly published in a newspaper of general circulation in said county of Montgomery; that this corporation since has been known by such new name, and has all the rights and powers existing, as if no such change of name had been made.

And your orator further shows unto your honors that by virtue of the premises, your orator, The National Cash Register Company,

became and now is the sole and exclusive owner of said letters patent No. 271,363, and the invention and improvement described therein, and of all the rights and privileges granted and secured or intended to be granted and secured thereby.

And your orator farther shows unto your honors that since it became the owner of said invention and letters patent, as aforesaid, it has invested and expended large sums of money, and has been to great trouble in and about said invention, and for the purpose of carrying on the business of manufacturing and selling cash registers and indicators embodying said invention and improvement, and making the same profitable to itself and useful to the public; that said invention has been and is of great benefit and advantage, and large numbers of cash registers and indicators have been made according to said invention and sold by your orator, The
4 National Cash Register Company, to the great advantage of the public, and that the public have generally acknowledged and acquiesced in the aforesaid rights of your orator; and your orator believes that it will realize and receive large gains and profits therefrom if infringements by said defendants and their confederates shall be prevented.

Yet the defendants, well knowing all and singular the premises and the rights secured to your orator, as aforesaid, but contriving to injure your orator and to deprive it of the benefits and advantages which might and otherwise would accrue to it from said invention, after the issuing of the letters patent as aforesaid, and since your orator became the sole and exclusive owner thereof and of all the rights and privileges thereunder, and before the commencement of this suit, did, as your orator is informed and believes, without the license and allowance and against the will of your orator and in violation of its rights, and in infringement of the aforesaid letters patent No. 271,363, unlawfully and wrongfully, and in defiance of the rights of your orator, make, use and vend to others to be used, the invention and improvement aforesaid, and did make, use and vend to others to be used, cash registers and indicators made according to and employing and containing said invention and improvement described and claimed in the aforesaid letters patent, and still continue so to do; and are threatening to make the aforesaid cash registers and indicators in large quantities and to supply the market therewith, and to sell the same.

All in defiance of the rights acquired by and secured to your orator as aforesaid, and to its great and irreparable loss and injury, and by which it has been and still is being deprived of great gains and profits which it might and otherwise would have obtained, but which have been received and enjoyed, and are being received and enjoyed, by the said defendants by and through their aforesaid unlawful acts and doings.

And your orator further shows unto your honors, on information and belief, that the defendants have sold a large number of said cash registers and indicators, and have a number on hand which they are offering for sale, and are preparing to manufacture and sell large quantities of the same. And your orator says that the use of

the said invention by the defendants, and their avowed determination to continue the same, and their other aforesaid unlawful acts, in disregard and in defiance of the rights of your orator, have the effect to and do encourage and induce others to venture to infringe said letters patent in disregard of your orator's rights.

And your orator further shows unto your honors that it has caused notice to be given to said defendants of said infringement, and of the rights of your orator in the premises, and requested them to refrain and desist therefrom, but that they disregard said notice and refuse to desist from said infringement, and still continue to make, use and sell cash registers and indicators embodying said invention and improvement.

And forasmuch as your orator can have no adequate relief except in this court, to the end that the defendants may be compelled to desist from the violation of the rights of your orator as above, and be restrained from any further violation of said rights, your orator prays that your honors may grant a writ of injunction restraining and enjoining the defendants, and each of them, their officers, agents, servants, attorneys and workmen, and each and every one of them, from directly or indirectly making, constructing, using, vending, working, or putting into practice, operation or use, or in anywise counterfeiting or imitating the said invention and improvement, or any part thereof, or any cash registers and indicators made in accordance therewith, or like or similar to those which they have heretofore made and sold in violation of the rights of your orator as aforesaid, and that the cash registers and indicators embodying the said invention and improvement, and now in the possession or use of said defendants, may be destroyed or delivered up to your orator for that purpose.

And your orator prays also for a provisional or preliminary injunction, and for such other relief as the equity of the case may require, and as to your honors may seem meet.

May it please your honors to grant unto your orator a writ of injunction conformable to the prayer of this bill, and also writs of subpœna of the United States of America, directed to the said Boston Cash Indicator and Recorder Company and the said James H. Wright, and commanding them to appear and answer unto this bill of complaint, and to abide and perform such order and de-
6 cree in the premises as to the court shall seem meet and be required by the principles of equity and good conscience.

And your orator will ever pray, etc.

THE NATIONAL CASH REGISTER COMPANY,
By JOHN H. PATTERSON, *President.*

PECK & RECTOR,
Solicitors and of Counsel for Complainant.

STATE OF OHIO,)
County of Hamilton,) *ss:*

On this sixteenth day of June, 1887, before me personally appeared John H. Patterson, who, being first duly sworn, says that he

is the president of The National Cash Register Company, the above-named complainant; that he has read the foregoing bill of complaint and knows the contents thereof, and that the same are true, except as to the matters therein stated on information and belief, and as to those he believes them to be true.

[SEAL.] L. K. TORBET,
Notary Public, Hamilton County, Ohio.

At the same term the following answer was filed:

Answer.

(Filed Oct. 4, 1887.)

The joint and several answer of The Boston Cash Indicator and Recorder Company and James H. Wright, defendants, to the bill of complaint of The National Cash Register Company.

These defendants, reserving to themselves all rights of exception to any and all matters contained in the said bill of complaint, for answer thereto, or so much thereof as they are advised is material to be answered, say:—

That they are informed and believe that letters patent dated Jan. 30, 1883, No. 271,363, and purporting to grant unto Jacob H. Eckert, as assignee of James Ritty and John Birch, his heirs and assigns, for the term of seventeen years from the date thereof, the ex-
65 clusive right to make, use and vend a certain alleged invention, in said letters patent entitled "improvements in cash registers and indicators," were issued out of the United States Patent Office; but these defendants, upon information and belief, deny that the said Ritty and Birch were the original, first and joint inventors of any new and useful improvement in cash registers and indicators, not in public use or on sale for more than two years prior to their application for said letters patent, as alleged in said bill of complaint, or of any improvement in cash registers and indicators described or attempted to be described in said letters patent.

And these defendants, further answering, say that they do not know and have not been informed, save by the complainant's bill, whether, prior to the thirtieth day of January, 1883, the said Ritty and Birch were citizens of the United States, or whether, by an instrument in writing duly recorded, the said Jacob H. Eckert transferred the supposed entire right, title and interest in and to said letters patent and in and to said alleged invention and improvement to the National Manufacturing Company named in said bill, as in said bill alleged; or whether the said National Manufacturing Company was a duly organized corporation under the laws of the State of Ohio; or whether the name of the said National Manufacturing Company was lawfully changed to the National Cash Register Company, as alleged in said bill; or whether any petition for such change of name was filed; or whether the other proceed-

ings, alleged in said bill in relation to such change of name, were had; or whether such change of name was ordered by any court; or whether a copy of such alleged order was filed or published, as alleged in said bill; or whether the complainant has, since such alleged order, filing and publication, been known by such new name; or whether the complainant has the same rights and powers as if no such alleged change of name had been made; or whether, at any time, all, or any part of the supposed right, title and interest in and to said letters patent, or in and to said alleged invention and improvement, or in and to any supposed rights and privileges intended to be granted and secured by said letters patent, became vested in the complainant; or whether the complainant has at any time invested large sums of money, or has been to great
7 trouble in or about said invention, or for the purpose of carrying on the business of manufacturing and selling cash registers and indicators embodying the supposed invention alleged to have been secured by said letters patent; or whether large numbers of cash registers and indicators have been made according to said alleged invention and sold by the complainant; or whether said invention has been or is of great or of any benefit or advantage to the complainant or to the public; and they leave the complainant to prove all such matters as it may be advised and as this honorable court may require.

And these defendants, answering, say that, as they are informed, advised and believe, they deny that the complainant was ever entitled to or possessed of the full and exclusive right of making, using and vending to others to be used within and throughout the United States and territories thereof, said alleged invention; and upon information and belief deny that the public generally have acknowledged and acquiesced in the rights alleged to have been granted by said patent.

And these defendants, further answering, say that, as they are informed, advised and believe, the alleged improvement described and claimed in said letters patent, or substantial and material parts thereof, did not, at the time of the assumed or pretended origination or discovery thereof by the said Ritty and Birch, constitute an invention or a discovery or the proper subject of letters patent within the intent of the statutes of the United States in such case made and provided, but had theretofore become matter of common knowledge to persons skilled in the arts to which said alleged invention most nearly relates.

And these defendants, further answering, say that, as they are informed, advised and believe, the alleged improvements, or substantial and material parts thereof, described and claimed as new in said letters patent, were, prior to said Ritty and Birch's supposed or pretended invention or discovery thereof, patented in the following named letters patent of the United States, and described in the specifications thereto respectively annexed and officially printed and published, to wit:

No. 253,506, dated Feb. 14, 1882, granted to Michael Campbell,

for improvement in cash-registering apparatus; No. 221,360,
7a granted Nov. 4, 1879, to James Ritty and John Ritty, for improvement in cash register and indicator.

And these defendants, further answering, say that, as they are informed, advised and believe, the alleged improvement, or substantial and material parts thereof, described and claimed in said letters patent, were, prior to the said Ritty and Birch's supposed or pretended discovery thereof, patented in the following-named letters patent of the Kingdom of Great Britain, and described in the specifications thereof duly enrolled and officially printed and published, to wit:

No. 1165, dated March 18, 1876, and granted to William Griffin for apparatus for preventing fraud in collecting money, etc.; No. 2076, dated May 28, 1877, granted to Henry Pottin for an improved cash-register apparatus; and in a provisional specification for improvements in machinery for calculating purposes, of Elise Eugenie Sonnet and Pierre Boissier, No. 661, left Feb. 19, 1879, with the commissioners of patent of said kingdom, and officially printed and published.

And the defendants, further answering, deny that they have violated any right of the complainant, and deny that they have infringed said letters patent, and deny that they have made, used or sold to others to be used any cash registers or indicators made according to or employing and containing said alleged invention and improvement.

And the defendants admit that they have received a notice purporting to be signed by the National Cash Register Company by John H. Patterson, its president, that the defendant corporation was manufacturing a cash-register in infringement of said letters patent, and requesting said defendant corporation not to manufacture the same.

And these defendants for the reasons above stated deny having done any wrong or injury to the complainant, and respectfully submit that the defendants ought not to be enjoined or restrained as the complainant has prayed in said bill; but without admitting that any other matter contained in the said bill of complaint, material to be answered and not herein already sufficiently answered,
8 is true to their knowledge and belief, submit that the complainant is not entitled to any relief against them or either of them.

All of which these defendants are willing to aver, maintain and prove as this honorable court may direct and pray to be hence dismissed with their reasonable costs and charges in this behalf most wrongfully sustained.

BOSTON CASH INDICATOR AND
RECORDER CO.,
By WILLIAM W. DREW, *Treas.*
JAMES H. WRIGHT, *Pres.*

ALBERT M. MOORE,
Solicitor and of Counsel for Defendants.

UNITED STATES OF AMERICA, *District of Massachusetts, Suffolk,* } ss:

On the sixth day of September, A. D. 1887, before me personally appeared William W. Drew, treasurer of the said Boston Cash Indicator and Recorder Company, and James H. Wright, president of said company, defendants named in the foregoing answer, and being duly sworn, severally deposed and said that they had read the foregoing answer, and that the same was true of their own knowledge, except as to matters therein stated on information and belief, and as to those matters that they believed it to be true.

WILLARD HOWLAND,
Notary Public.

[SEAL.]

This cause was thence continued to the October term, 1887, when the following replication was filed:

Replication.

(Filed Nov. 7, 1887.)

The replication of the above-named complainant to the answer of the above-named defendant.

This repliant, saving and reserving to itself, now and at all times hereafter, all and all manner of benefit and advantage of exception which may be had or taken to the manifold insufficiencies of said answer, for replication thereunto says that it will aver, maintain and prove its bill of complaint to be true, certain and sufficient in law to be replied unto, and that the said answer of the said defendant is uncertain, untrue, and insufficient to be replied unto by this repliant; without this, that any other matter or thing whatsoever in the said answer contained material or effectual to be replied unto and not herein well and sufficiently replied unto, confessed and avoided, traversed or denied, is true; all which matters and things this repliant is and will be ready to aver, maintain, and prove as this honorable court shall direct, and humbly prays as in and by said bill it has already prayed.

9

PECK & RECTOR,
Solicitors for Complainant.

This cause was thence continued from term to term to the present October term, A. D. 1890, when, publication of testimony having passed in the clerk's office, the same is set down for hearing and fully heard by the court, and after due consideration thereof the opinion of the court is announced and the following final decree entered:

Final Decree.

(Entered March 23, 1891.)

This cause came on to be heard at this present October term, A. D. 1890, upon the pleadings and proofs and was argued by counsel

for the respective parties; and now, upon consideration thereof, to wit, March 23, 1891, it is ordered, adjudged, and decreed that the bill of complaint in this cause be, and the same is hereby, dismissed with costs for the defendants, taxed at —.

10 *Claim of Appeal.*

From this decree the complainant in open court claims an appeal to the Supreme Court of the United States, and gives good and sufficient security that it will prosecute its appeal to effect and answer all damages and costs if it fail to make its plea good and said appeal is allowed.

A true record.

Attest: JOHN G. STETSON, *Clerk.*

11 The following is the evidence used at the hearing of said cause before said circuit court, namely:

Evidence for Complainant.

Taken pursuant to the sixty-seventh rule of the Supreme Court of the United States, in equity, as amended, before me, George S. Bailey, special examiner.

CINCINNATI, OHIO, *Sept.* 29, 1888.

Present: Charles M. Peck, Esq., and Edward W. Rector, Esq., of counsel for complainant; Albert M. Moore, Esq., of counsel for defendants.

Deposition of James W. See.

Direct examination by EDWARD W. RECTOR, of counsel for complainant:

Int. 1. Please state your name, age, residence, and occupation.

Ans. James W. See; age, thirty-eight years; residence, Hamilton, Ohio; I am a consulting engineer.

Int. 2. Please state what experience, if any, you have had qualifying you to express opinions on mechanical matters and patents, and especially with regard to cash-registering devices.

Ans. For many years I have been engaged in mechanical pursuits. I served an apprenticeship at the machinist's trade and
12 worked in a large number of establishments engaged in the manufacture of about every class of machinery. Have been engaged in such establishments as designer and contriver of machinery and as draughtsman. Later I engaged in business as consulting engineer, it becoming my duty to pass upon newly constructed or proposed mechanism, and determine as to its fitness for the end aimed at, and as to its adaptation to economical construction.

I now occupy the position of consulting engineer to a large number of machine-manufacturing concerns in the United States and some in Europe. Some of the most important questions that come

before me professionally relate to the bearing of existing patents upon machines that my clients propose to construct. In this connection it becomes my duty to analyze patents and the proposed constructions, and to point out where, if anywhere, infringement exists, and, if possible, to point out changes which will avoid the infringements.

Aside from matters of infringement, if points of patentable novelty present themselves in the new structure, I serve as solicitor in procuring patents for the inventors. In fitting myself for this work, I made a study of patent laws. I am frequently called as an expert in legal questions involving mechanism and patents. As to my experience with cash-registering devices, I would say that I have had a great deal of experience in the design, construction and use of mechanism intended for the automatic performance of mechanical calculations and registrations, a class of mechanism of which the so-called registers are merely exponents.

(Complainant's counsel offers in evidence a certified copy of the articles of incorporation of the National Manufacturing Company of Dayton, Ohio.

Also a certified copy of the record of proceedings in the common pleas court of Montgomery county, Ohio, changing the name of said corporation to the National Cash Register Company.

Also a certificate of the secretary of state of the State of Ohio of the record of such change of name in the office of the secretary of state.

Also proof of publication of notice of such change of name.

Also a certified copy of letters patent of the United States No. 271,363, granted to Jacob H. Eckert on the application of
13 James Ritty and John Birch, Jan. 30, 1883, for an improvement in cash registers and indicators.

Also a certified copy of the assignment of said invention by the said Ritty and Birch to the said Jacob H. Eckert.

Also a certified copy of the assignment of said letters patent No. 271,363 by the said Jacob H. Eckert to the National Manufacturing Company of Dayton, Ohio.

Also a machine marked "Complainant's Exhibit Defendants' Machine, George S. Bailey, notary public, Hamilton county, Ohio," being the machine referred to in the stipulation of this date, Sept. 28, 1888, between counsel for complainant and counsel for defendants in this cause.)

Int. 3. Have you examined, and do you understand letters patent of the United States, No. 271,363, granted to Jacob H. Eckert as assignee of James Ritty and John Birch, Jan. 30, 1883, for an improvement in cash registers and indicators?

Ans. I have, and believe that I do.

Int. 4. Have you examined, and do you understand the construction and mode of operation of the cash register and indicator above offered in evidence and marked "Complainant's Exhibit Defendants' Machine, George S. Bailey, notary public, Hamilton county, Ohio"?

Ans. Yes.

Int. 5. Will you please compare said Exhibit Defendants' Machine with said letters patent No. 271,363, and state whether or not, in your opinion, the invention covered by the first claim of said patent is embraced in said exhibit, giving your reasons for any opinion you may express?

Ans. The patent and the exhibit pertain to machines for mechanically checking the dishonesty of a money-taker. They are machines which mechanically add up the separate sums received, the machinery being under lock and key, and thus permits the proprietor at the end of the day to know the total which his employee must account for.

Adding machines are very old and well-known affairs, and have long been used to add in given quantities to form a total. These cash-registers, however, involve something more than mere
14 addition. If the employee applies to the machine the proper figure it will add it properly into the total, but in order to have the machines of any value for cash-registering purposes some means must be provided to insure that the employee will supply the machine with the proper figure. If the employee collects fifty cents and tells the machine to add in forty cents only, and the machine does so, then it is at once apparent that the machine is of no value for the purpose designed.

In the cash-register system the customer is made an element of the detective system. When the customer pays money to the clerk, say fifty cents, the clerk operates the machine accordingly, to add fifty cents to the total receipts. Such operation of the machine exposes a tablet reading fifty cents and at the same time rings a bell to call the attention of the purchaser to the tablet, as much as to say to the purchaser, "Look here a minute; this clerk says you just paid him fifty cents, is that correct?" The presumption is that the customer has sufficient interest in the transaction to object to having paid more money than the circumstances would indicate as being called for. An attempt on the part of the clerk to count up only forty cents on the machine would therefore be detected by the purchaser.

In the machine of the patent there are twenty finger keys, like piano keys, one marked ".05c.", another "10c.", another "15c.", and so on up to a dollar.

The machine contains adding mechanism, an understanding of which is not essential to the present issue. Suffice to say that if the fifteen-cent key be pressed upon, the adding mechanism will add fifteen cents to the previous total. For each of these keys there is a vertical tablet rod, whose upper end bears a tablet figured 5c., 10c., etc., according to its key. Normally these tablets are all out of sight.

If the fifteen-cent key be pressed, fifteen cents will be added in the machine, and the fifteen-cent tablet will rise and be exposed at a window in the machine, and the bell will ring to call attention to it, and this tablet will remain exposed until the next transaction calls for the pressing of another key, whereupon the new tablet becomes exposed and the old tablet falls. There is no way of getting

an exposed tablet down without performing an act of addi-
15 tion, and there is no way of getting a given tablet up without pressing its appropriate key and performing its appropriate addition. It is therefore impossible for a clerk to expose a seventy-five-cent tablet and add in any lesser sum. The machinery must be accurate and must necessarily involve much delicacy of motion.

The first claim of the Ritty and Birch patent relates entirely to the devices for elevating, supporting and releasing the tablets when their appropriate keys are pressed. Each tablet rod slides freely vertically in guides, and a rod moves upward when its appropriate key is pressed. Each tablet rod has a downwardly presenting shoulder or detent, which, when the tablet rod rises to a proper height, can be caught by a support to hold the tablet rod up. So long as this support is under the detent the tablet rod is up and the tablet exposed. The support is a wing or moving piece capable of catching under the detent of the rod to hold the rod up, and capable, when a second rod rises, of moving from under the detent of the first rod and allowing the first rod to fall, and engaging the detent of the second rod and holding it up. The support thus engages and holds up any rod just raised and lets down any rod previously up. Mechanism is connected with the finger keys and with the support in such manner that proper movement is given to the support upon the manipulation of the finger key.

The first claim of the Ritty and Birch patent reads as follows:—

"1. In a registering and indicating machine, the combination, with a series of indicating tablets operated by a series of keys of a series of rods, each provided with a detent or shoulder, and carrying one of the aforesaid tablets and a supporting wing with connecting mechanism, whereby upon operating any one of the keys the wing is so moved as to permit the passage of the rod, and whereby upon the release of the key the wing engages with and holds up the tablet rod and tablet, substantially as described."

In the machine of the patent the count, as the arrangement is illustrated, is for amounts from five cents up to one dollar, there being twenty keys, the specification stating, however, that "any number may be employed." It is common in the construction of the patented machines to my knowledge to provide them with additional keys for larger amounts, the machines thus counting from say one cent to ten dollars.

16 Defendants' machine is practically two machines, one for cents and one for dollars, each machine having its independent adding mechanism. The whole, however, is united into one structure or casing containing the dual mechanism, the right-hand side for cents and the left-hand side for dollars. Both sets are alike except as to the figuring. As the matter involved in the claim of the patent relates only to the tablet and immediate associations, and as the entire mechanism, including the adding mechanism, is somewhat complicated and not involved in the issue, and as the multiplicity of the tablets might be somewhat perplexing, I have removed from the dollar side of defendants' machine all of the add-

ing mechanism and all but two of the tablets, viz., the one-dollar tablet and four-dollar tablet.

Defendants' machine, as I thus leave it, presents the right-hand side or cent side complete in all respects, and the left-hand side complete only so far as the mechanism pertaining to two tablets is concerned, my intention being to render the construction and mode of operation of those features in controversy more readily comprehensible.

In defendants' machine there is a separate finger key for each amount that the machine is to deal with, as in the patent. The rear end of each finger key rests below a vertical tablet rod movable in guides and bearing at its upper end its appropriately inscribed tablet. From each tablet rod there projects forwardly a pin forming a downwardly presenting shoulder or detent. Normally this detent rests upon one of the guide-pieces and supports the tablet rod in normal low-down position. There is a sliding bar provided with projections, one projection for each tablet rod, this bar being capable of endwise movement so that these projections may be moved under or from under the detents of the tablet rods.

Mechanism, a bell-crank lever and a follower, connects this sliding bar with all the finger keys, so that upon proper movement of any finger key, endwise movement will be given to the bar. The consequence of this arrangement is that all tablets being down, if one finger key be pressed its tablet will begin to rise and simultaneously the supporting bar will move to allow the detent of the tablet rod to rise till the tablet occupies its exposed position. Then
17 the supporting bar moves endwise and catches under the detent of the raised tablet rod.

When another key is pressed, its tablet begins to rise; the supporting bar moves endwise and allows the exposed tablet to fall and the new tablet to rise to the exposed position, and then the supporting bar catches under the detent of the new tablet. The construction, arrangement, mode of operation, and the result are substantially as in the Ritty and Birch patent.

Directly comparing defendants' machine with the Ritty and Birch patent, I therefore find as follows:

Both are "registering and indicating machines." In each there is "a series of indicating tablets operated by a series of keys." In each there is "a series of rods, provided with a detent or shoulder, and carrying one of the aforesaid tablets."

In each there is "a supporting wing with connecting mechanism." In each the construction and operation is such that upon "operating any one of the keys, the wing is so moved as to permit the passage of the rod, and upon the release of the key, the wing engages with and holds up the tablet rod and tablet."

I am therefore of the opinion, for the reasons given, that the invention covered by the first claim of the patent is embraced in the Exhibit Defendants' Machine.

(Adjourned.)

SEPT. 28, 1888.

Int. 6. What parts of the Ritty and Birch machine do you understand to be referred to by the term "connecting mechanism" in the first claim of the Ritty and Birch patent?

Ans. The term "connecting mechanism" of the claim does not in the specification receive a direct definition. The result set forth in the claim is a result due entirely to the combination recited in the claim, and to arrive at a definition of the term in question, I would primarily inquire into what mechanism is necessary, in addition to that nominated, in order to produce the described result.

In the Ritty and Birch device the tops of the detents of the tablet rods are bevelled, so that as they rise they themselves operate upon the supporting bar or wing and give it the proper
18 movements at the proper times. Viewing the patent device as thus constructed, the only "connecting mechanism" found essential to the performance of the result is mechanism for supporting the wing or supporting bar, and for endowing it with elastic engaging motion. In other words, bearings for the wing or supporting bar, and a spring for it.

But if the detents be themselves depended on for giving proper movement to the supporting bar, then extreme and almost impossible accuracy is required in the construction, and fatal derangement might quickly result, either from wear or friction or accumulations of dust. The patent machine, therefore, has an additional mechanism for moving the supporting bar or wing. Referring to Fig. 1 of the Ritty and Birch patent, K is a pressure bar lying along under the forward end of all the keys, this pressure bar being pivoted to the pivot D of the keys. Pressing down any one key will depress this pressure bar.

The pressure bar has a lever or arm J connected by means of a link and lever *p m* to a bell-crank lever L. This bell-crank lever, when oscillated, touches and moves the supporting bar or wing I. Therefore, when any key is pressed the bell crank lever L, receiving motion from the pressure bar K, gives motion to the supporting bar or wing, causing it to properly engage and release the detents.

Thus viewed, "connecting mechanism" is mechanism connecting the supporting bar with all of the keys, "whereby upon operating any one of the keys the wing is so moved as to permit the passage of the rod, and whereby upon release of the key the wing engages with and holds up the tablet rod and tablet."

Int. 7. Do you find in the Exhibit Defendants' Machine any connecting mechanism corresponding to that referred to in the first claim of the Ritty and Birch patent? If so, please point it out and describe its construction and mode of operation.

Ans. I do find such mechanism in defendants' machine, performing in the same manner and accomplishing precisely the same result. There is a pressure bar lying along the entire series of keys, and pivoted to their common pivot and oscillated by the movement of any one of them. A bell-crank lever connects this pressure bar with the supporting bar of the tablet rods, so that when any one of

the keys is depressed the pressure bar is oscillated and the
19 supporting bar properly moved to allow the tablet rod to arise and the previous tablet rod to fall, the engaging motion of the supporting bar being effected by a spring, the same as is the case in the Ritty and Birch patent. In other words, this mechanism, operated by any of the keys, moves the supporting bar so as to let the new tablet rod rise and the old one fall, and a spring restores the supporting bar to its normal supporting position so as to hold the new tablet up.

Cross-examination by ALBERT M. MOORE, Esq., counsel for defendants:

Cross-int. 8. Have you previously testified as an expert witness in patent causes?

Ans. Yes, sir; on quite a number of occasions.

Cross-int. 9. Have you ever testified as an expert witness in any suit brought upon the patent upon which this suit is brought? If so, when and where, and who were the parties to that suit?

Ans. I have. At Cincinnati, within the last year, I think. Complainant was The National Cash Register Company. I do not know the name of the defendant party. I knew it at the time, I think, but do not now.

Cross-int. 10. Was The Hopkins and Robinson Company the defendant in that suit?

Ans. I do not know. The name Hopkins seems familiar in that connection, but I have no recollection of the name Robinson.

Cross-int. 11. Do you know whether that suit was brought in the United States circuit court at Louisville, Ky.?

Ans. I do not.

Cross-int. 12. Are you familiar with the state of the art as relating to cash registers and indicators in Feb. 15, 1882, the time when Ritty and Birch filed their application for the patent on which this suit is brought?

Ans. Not thoroughly.

Cross-int. 13. Are you sufficiently acquainted with the state of the art relating to such matters to state whether in a registering and indicating machine a series of indicating tablets were known and used at that time?

Ans. They were known and described in prior patents.

20 Cross-int. 14. And at that time indicating tablets operated by a series of keys and supported individually upon rods, each rod being provided with a detent or shoulder, were also known and described in previous patents, were they not?

Ans. I cannot say as to this, as I have no very distinct recollection of the prior state of the art as it was laid before me. I have no distinct recollection one way or the other regarding detents or shoulders on the tablet rods, or their performance if present.

Cross-int. 15. And of course then your last answer will apply to the supporting wing mentioned in the Ritty and Birch patent, will it not?

Ans. It will apply to most all of the details of the machines except those common to all machines of this class. As stated before I have not retained a strict memory of the details of construction of prior devices. They would, I think, come to me in the presence of reminders.

Cross-int. 16. In your opinion I judge the supporting wing shown and described in the Ritty and Birch patent is the full equivalent of the sliding rod which holds up the indicating tablets in the Complainant's Exhibit Defendants' Machine.

Ans. Yes, sir; inasmuch as both are supporting bars disposed across all of the tablet rods and adapted for engaging and releasing motion with reference thereto under the influence of any finger key, and having the performance and result precisely as recited in the first claim of the patent; and inasmuch as it was common in the arts, where a movement of approach and recession was wanted, to arrange the part in question to work alternatively in bearings of reciprocation or in bearings of oscillation.

Cross-int. 17. And you would consider, would you not, any reciprocating piece adapted to engage with a shoulder or notch on a tablet rod and hold the same in a raised position and being also adapted when moved aside to allow said tablet rod to fall, the equivalent of the wing shown in the Ritty and Birch patent?

Ans. Assuming a series of these tablet rods, I would, as I understand your question, answer undoubtedly, yes.

Cross-int. 18. Have you any doubt that you do understand the question?

21 Ans. The only doubt springs from possible unmentioned elements in the association you recite. An association might be found responding precisely to your question, and yet containing other elements whose very presence and intended performance would emasculate the supporting rod, as I have such supporting rod in my mind; that is to say, a supporting rod capable of movement to permit one detent to pass up and another to pass down, and then to engage the up detent and hold it up till another rose.

Cross-int. 19. Will you illustrate what you mean by the words in your last answer, "other elements whose very presence would emasculate the supporting rod"? That is, I don't quite understand what you mean by these words. Please state what you allude to by other elements.

Ans. I have no illustration in mind, but simply wish to contemplate the possibility of there being such an impending element.

Cross-int. 20. In your opinion it is immaterial whether the supporting device swings in a direction from the front to the back of the machine, or at right angles to the direction last named, is it not? Other things being equal, the supporting device would still be the equivalent of the supporting wing in the Ritty and Birch patent, although its motion might be in a direction at right angles to the direction of motion of the wing in said patent, would it not?

Ans. Other things being equal, this mere change in direction of motion, without change of office, would be immaterial.

Cross-int. 21. And in your opinion, a wing pivoted at its upper

edge and provided at its lower edge with a hook or ledge adapted to reach under the detents of the tablet rods and hold them in a raised position, would, other things being equal, be the equivalent of the wing shown in the Ritty and Birch patent, would it not?

Ans. I should say yes, but in all such questions I risk an opinion in the absence of a delineative sketch. I think, however, I understand your question.

Cross-int. 22. In your opinion would a series of hooks pivoted at their upper ends and connected between their ends by a rigid rod or bar to which all of said hooks are pivoted, each of said hooks being adapted to engage a detent, shoulder or notch on each
22 of a series of tablet rods, other things being equal, be the equivalent of the wing shown in the Ritty and Birch patent?

Ans. I do not believe I could make a sketch of the device you appear to have in mind. I think some proper sketch should accompany your question or any question thus dealing with a hypothetical construction; and further yet, with that hypothetical construction when hypothetically modified.

I must, therefore, with no intended disrespect, decline to express an opinion on the matter or any similar matter similarly deficient in expression.

Before I can form any idea on such a matter I must picture the device clearly in my mind and I find it difficult to do this; far more difficult, I take it, than it would be for you to put your mental picture on paper for me to testify from.

Cross-int. 23. Can you not conceive of a series of books precisely alike, pivoted at their upper ends at the same height, and connected between their ends by a rigid rod or bar to which all of said hooks are pivoted in such a manner that while all of said hooks are free to swing on their upper pivots they must all swing together? Can you not also conceive of a series of tablet rods each provided with a detent, shoulder or notch such that when any tablet rod is raised and the hooks are swung in one direction one hook will engage the shoulder, notch or detent and prevent the tablet rod to which said shoulder, notch or detent belongs from falling back to the position from which it was raised?

Ans. Leaving out matters of further association, I cannot conceive of "a series of hooks pivoted at their upper ends at the same height and connected between their ends by a rigid rod or bar to which all of said *hooks* are pivoted." I might smile at my own stupidity were I to see the device or a picture of it.

Cross-int. 24. Can you conceive of the tablet rods having their detents on their sides as you face the machine when operating it?

Ans. Yes, sir; readily.

Cross-int. 25. Can you also conceive of a series of wings, one for each tablet rod, all of said wings turning upon parallel horizontal pivots and connected above their pivots by a rod which runs the whole length of the series of wings and is pivoted to each
23 of them in such a manner that all of said wings may be turned at once upon their pivots.

Ans. I cannot with any satisfaction to myself.

Cross-int. 26. Allow me to ask if you see any contradiction in terms in my last question. I wish to be understood if possible.

Ans. Your former question, cross-int. 23, contained a contradiction of terms. Your last one is objectionable for comprehensiveness and consequent vagueness, as twenty different constructions might respond to it. Should I begin to sketch on paper my understanding of your question you could very properly suggest many modifications of the sketch until it represented the thing you seek to ask about.

Cross-int. 27. Please state where the contradiction exists in cross-int. 23.

Ans. In a series of hooks "pivoted at their upper ends and connected between their ends by a rigid rod or bar to which they are pivoted."

Cross-int. 28. Do you mean to say that it is inconsistent that they should be pivoted at their upper ends and also pivoted between their ends with a rigid bar, in such a manner that if the bar is moved all of the hooks will turn upon their pivots. Do they not turn upon their upper pivots, when said bar is moved longitudinally, and also turn upon the bar?

Ans. Take a lot of hooks alike, and each with a hole at its top and a hole at its midlength. String the upper ends of all these hooks on a horizontal pivot bar properly supported. The hooks will all be free to swing independently. Run another rod through all the middle holes. Move this second bar transversely, and all the hooks swing in a body. Move this bar longitudinally, and as I understand it, there would be no effect except toward the withdrawal of the rods from the hooks or its further insertion as the case might be.

Adjourned.

SEPT. 29, 1888.

Cross-int. 29. Is it not, in your opinion, true that in a registering and indicating machine having indicating tablets supported upon tablet rods provided with detents—that is, a detent
24 upon each tablet rod, any moving piece capable of catching under the detent of any rod to hold the rod up, and capable, when a second rod rises, of moving from under the detent of the first rod and allowing the first rod to fall and engaging the detent of the second rod and holding it up, and which thus engages and holds up any rod just raised and lets down any rod previously up, is the equivalent of the wing shown and described in the Ritty and Birch patent?

Ans. That is my understanding of it.

Cross-int. 30. That is to say, it is your opinion, is it not, that in a registering and indicating machine of the kind referred to in the first part of the last question, assuming also that the machine has keys or key levers capable of operating the tablets and tablet rods, any device, such that upon operating any one of the keys said device is so moved as to permit the passage of the rod and upon the

release of the key the device engages with and holds up the tablet rod and tablet, is the equivalent of the wing and "connecting mechanism" shown in the Ritty and Birch patent?

Ans. It does not follow, as I understand your question, which seems to be intended as a modifier of the previous question. Your last preceding question was fully answered, and the statement in your last question is not a proper paraphrase of that answer.

Cross int. 31. Please state your opinion as to whether the device supposed in the last question is the equivalent of the wing and "connecting mechanism" shown in the Ritty and Birch patent. What I want is, if possible, to find out whether, in your opinion, the form of the "connecting mechanism" is material, or whether any connecting mechanism, capable of operating the wing or equivalent device described in the Ritty and Birch patent in the manner therein described, is equivalent of the "connecting mechanism" described in said patent.

Ans. As I understand the matter, my opinion is, that, assuming the result set out in the claim to be a new result, any connecting mechanism, operating in substantially the same manner to produce that result, is the equivalent of the connecting mechanism referred to in the claim of the patent. All these matters of opinion sought from me involve necessarily that I shall assume as a basis some sort of a construction for the claim. My evidence as to the construction of the claim would of course be incompetent, but it is necessary for me to assume a basis to start on. I have therefore assumed that the invention claimed in the first claim of the patent was not the "connecting mechanism," or the "series of keys," or the "supporting wing," or any other individual element which might be old or might be new, but was the combination of several elements, all of which might well be old individually, associated for the production of the new result, and that any individual element recited as belonging to the organization would find its equivalent in any substituted element which would perform in the organization the share of the combination result pertaining to the element for which it was substituted.

Cross-int 32. Is it material whether the detent is on the tablet rod or on the tablet?

Ans. I should say not, for, as I understand it, fine print on the end of the tablet rod would constitute that end of the rod the tablet, and the enlarged tablet found at the end of the rod is a mere expedient and a common one for permitting the presence of coarse print to be read at a distance.

Cross-int. 33. Please look at the copy now shown you of the United States patent No. 253,506, granted to Michael Campbell, Feb. 14, 1882, and say whether you find therein the equivalent of the wing and tablets or tablet rods provided with a detent.

(Question is objected to by complainant's counsel as improper cross-examination, for the reason that said patent is not in evidence in this cause, and has not been referred to in the direct examination of this witness, and defendant's counsel is notified that upon or be-

fore the hearing of this cause complainant's counsel will move the court to strike out all cross-questions and answers of this deposition which are based on the patent referred to in the question.

Defendant's counsel withdraws the question.)

Direct examination resumed:

Int. 34. In answer to Int. 6 of your direct examination you state it to be your opinion that the "connecting mechanism" referred to in the Ritty and Birch patent is "mechanism connecting the supporting bar with all of the keys whereby, upon operating
26 any one key of the keys, the wing is so moved as to permit the passage of the rod, and whereby, upon release of the key, the wing engages with and holds up the tablet rod and tablet;" and in answer to cross-int. 17 you give it as your opinion that "any reciprocating piece adapted to engage with a shoulder or notch on a tablet rod and hold the same in a raised position, and being also adapted when moved aside to allow said tablet rod to fall," would, assuming a series of such tablet rods to be employed, be the equivalent of the wing shown in the Ritty and Birch patent.

Is it your opinion that any device or machine would respond to the first claim of the Ritty and Birch patent, and particularly to the terms "wing and connecting mechanism" contained therein, if such device or machine did not embody mechanism connecting the supporting bar with all of the keys for positively moving the supporting bar upon the operation of any key, independently of any movement given to said bar by the detents or shoulders on the tablet rods?

Ans. Assuming it to be old to so arrange the parts in such a machines that the supporting bar has been moved by the actual influence of the tablet rods themselves, the importance of connecting mechanism to accomplish the result and relieve the tablet rods of the duty is to be recognized. With this view the claim involves, as an essential element, "connecting mechanism" for transmitting motion to the supporting bar from the keys, independently of the tablet rods. The claim could thus not be responded to by any structure not containing the connecting mechanism.

Cross-examination resumed:

Cross-int. 35. In the machine shown and described in the Ritty and Birch patent does the elbow or shoulder *d* assist in pushing back the wing? I mean does the elbow or shoulder on the tablet rod act upon the wing when the tablet rod rises?

Ans. That depends entirely upon the adjustment of the parts. If the "connecting mechanism" be removed entirely or adjusted to an inert position, then the elbows or detents will perform alone the entire office of giving movement to the supporting bar. If, on the other hand, the connecting mechanism be present and appropriately adjusted, it alone will perform the entire duty of giving proper
27 movement to the supporting bar, the detents being relieved entirely of the work.

Again, the parts may be adjusted to act in unison and perform

the duty in common, the connecting mechanism aiding the detents and the detents aiding the connecting mechanism, either being able to perform the entire duty alone were the other not adjusted to the aiding position. Operation under the last-mentioned method of adjustment is the one described in the patent, on page 2, lines 85–88, "When any key is pressed down, its rod and tablet are raised and the elbow *d* of the rod, in rising, aids in pressing back the wing I; but to aid the elbow the arm J * * * is drawn forward whenever a key is pressed." Thus each aids the other.

Cross-int. 36. Other things being equal, would a separate connecting mechanism for each key connecting said key and the supporting wing be the equivalent of the connecting mechanism shown and described in the Ritty and Birch patent?

Ans. I do not know and could not form an opinion without considerable study over a model or drawing embodying such a construction.

Cross-int. 37. Other things being equal, suppose there were a separate pressure bar K for each key, each pressure bar having an arm J connected by means of a link and lever *p m* with a separate bell-crank lever L (the parts referred to by letters being constructed and arranged substantially as the parts marked with the same letters in the Ritty and Birch patent), and each bell-crank lever, when oscillated, moving the wing J as described in said patent and in your answer to Int. 6, except that there is a plurality of pressure bars (there being one pressure bar for each key, and the depression of any key operating but one pressure bar), would such a construction, in your opinion, be the equivalent of the connecting mechanism described and shown in the Ritty and Birch patent?

Ans. I would venture the opinion that it would, as long as it lasted. It would be, I think, a complicated, short-lived and troublesome rig in the hands of the class who use cash-registers.

J. W. SEE.

Attest: GEORGE S. BAILEY,
Special Examiner.

28 *Evidence for Defendants.*

Taken pursuant to the sixty-seventh rule of the Supreme Court of the United States, in equity, as amended, before me, Willard Howland, special examiner.

BOSTON, *Jan.* 17, 1889.

Present: Edward W. Rector, Esq., of counsel for complainant; Albert M. Moore, Esq., of counsel for defendants.

Deposition of Nathaniel Hill.

Direct examination by ALBERT M. MOORE, Esq., of counsel for defendants:

Int. 1. Please state your name, age, residence, and occupation.

Ans. Nathaniel Hill: age, forty-seven years; occupation, a civil and mechanical engineer; reside in Lowell, Mass.

Int. 2. How long have you been engaged as a civil and mechanical engineer?

Ans. Since 1864.

Int. 3. What other occupations, if any, relating to mechanical matters have you been engaged in, and what experience have you had in comparing different mechanical constructions, and have you ever testified as an expert in a patent cause?

Ans. I have made a very large number of drawings to illustrate inventions since the year 1867, and have prosecuted many applications for patents, and have testified as an expert in a number of cases.

Int. 4. Have you examined United States patent No. 271,363, granted Jan. 30, 1883, on the application of Ritty and Birch, and do you understand the same and the invention therein described?

Ans. I have examined this patent, and I have no doubt I understand the specification and the invention therein described.

29 Int. 5. Are you familiar with the relation of said invention to the prior state of the art?

Ans. I am familiar with some portion of the state of the art prior to the invention, certainly.

Int. 6. Will you compare the invention described in said patent with the prior state of the art as known to you, and state what you consider the novelty of said invention?

Ans. Ritty and Birch patent, page 1, line 24, says: "The novelty of our invention consists in the construction, combinations and arrangements of various parts, as will be herewith set forth and specifically claimed." The first claim in the Ritty and Birch patent is as follows: "In a registering and indicating machine the combination, with a series of indicating tablets, operated by a series of keys, of a series of rods, each provided with a detent or shoulder, and carrying one of the aforesaid tablets, and a supporting wing with connecting mechanism, whereby upon operating any one of the keys the wing is so moved as to permit the passage of the rod, and whereby upon the release of the key the wing engages with and holds up the tablet rod and tablet, substantially as described."

On page 2, line 85, in describing the operation of the machine, the patent says: "When any key is pressed down, its rod and tablet are raised, and the elbow *d* of the rod, in rising, aids in pressing back the wing I;" this mechanism, the elbow of the rod and the pivots of the wing, are sufficient to perform the operation, described in claim 1, of moving the wing so "as to permit the passage of the rod." The second object of the connecting mechanism named in claim 1 is attained by the spring attached to the wing.

In the specification of Henry Pottin, No. 2076, year 1877, is shown a series of indicating tablets, operated by a series of keys, a series of rods, each provided with a detent or shoulder, and carrying one of the aforesaid tablets and a supporting bar with connecting mechanism, whereby upon operating any one of the keys the supporting bar is so moved as not only to permit a passage of the rod, but to permit a much more essential action of releasing any rods heretofore raised, and permitting the tablets thereon to fall out of

view, and also, on the release of the key, to effect the engagement of the supporting bar with the shoulder of the tablet rod.

30 The M. Campbell patent, No. 253,506, patented Feb. 14, 1882, shows a series of keys, operating a series of tablets, with a connecting mechanism, whereby on pressing or operating any one of the keys a supporting bar is so moved as to permit the passage of the rod, whereby upon the release of the key the bar engages with and holds up the tablet rod and tablet, this last-named patent effecting all that is claimed in Ritty and Birch patent, claim 1, while the Pottin patent effects a more important purpose, as well as the objects claimed in claim 1 of the Ritty and Birch patent.

(Counsel for defendants offers in evidence copy of English patent No. 2076 of 1877, to Henry Pottin for cash-register apparatus, and the same is marked "Defendants' Exhibit Pottin Patent."

Counsel for defendants also offers in evidence copy of United States patent No. 253,506, granted to Michael Campbell, Feb. 14, 1882, for cash-registering apparatus, and the same is marked "Defendants' Exhibit Campbell Patent.")

Int. 7. In what does the novelty of the Ritty and Birch invention consist, in your opinion?

Ans. The only novelty embodied in the first claim can be in the use of a pivoted wing, in place of a supporting bar capable of an endwise motion, all the other parts being shown in the Pottin patent.

Int. 8. In your opinion, does the specification of the Ritty and Birch patent enable a mechanic of ordinary skill in the arts most nearly relating to cash registering and indicating machines, to construct an operative machine; that is, taking the drawings to be a part of the specifications? And state your reasons for your opinion.

Ans. I do not think that a mechanic, constructing a machine operating as described in the Ritty and Birch patent, could produce an operative cash registering and indicating machine, for the reason, as the Ritty and Birch patent says (line 21, page 2), "Now it is an important feature of our machine, that after a key has been operated and its tablet exposed to view, such tablet shall remain up and exposed until another key is operated, whereupon the first falls back out of view and the second remains exposed, and so on, thus always keeping in view the tablet of the key last operated." On line 88, page 2, the patent says, "but to aid the elbow the arm J on the

31 right, which, as before explained, is drawn forward whenever a key is pressed, imparts motion to the link p and trigger m, whose upper end, acting on the nose l of the follower j, presses it back, and with it the bell crank L, which is thus forced against the wing and presses it back." We have here a mechanism which acts against the wing at the same time and to the same degree as the elbow d of the rod; the result of this is, that the (counsel for defendants puts in evidence model marked "Defendants' Exhibit Ritty and Birch Specification Model") tablets heretofore raised will not be released and fall out of view, as is essential in a

cash-indicating machine. A model in which the two mechanisms, operating as described in the specification, and marked "specification model," illustrates the action of the tablet rods, and to produce the model it is found necessary to vary from the form of trigger shown in drawing.

Int. 9. Please look at Complainant's Exhibit Defendants' Machine, and say whether you understand the same and its mode of operation.

Ans. I have looked at the machine, and I have no doubt but what I understand its operation.

Int. 10. Will you compare the machine referred to in the last interrogatory with the invention shown and described in the Ritty and Birch patent, and say whether, in your opinion, the combination expressed in the first claim of said patent is found in said machine, and your reasons for your opinion?

Ans. In the Webster machine, which is the complainant's exhibit, the tablet rods and tablets, the rods having shoulders or arms, are found as in the Ritty and Birch specification and also in the Pottin specification; the series of keys are found in all three named. A supporting bar is found as in the Pottin patent instead of the pivoted wing as in the Ritty and Birch patent. A wing or pivoted plate, overlying the keys and provided with a pin, operates a cam lever which acts on an arm attached to the supporting bar, and on operating any key the supporting bar is so moved as to release the tablet rods already up and exposing the tablets to view and permits the tablets to fall out of view, and no part of the movement of the supporting bar is effected by the action of the shoulder on the rod;
a spring attached to the supporting bar draws the support-
32 ing bar back under the shoulder or arm of the tablet rod, thus holding the last tablet operated upon up until a new tablet is raised by the operation of its key.

In the Ritty and Birch patent the wing is pressed back by the elbow of the rod or needlessly aided by arm J, link *p*, trigger *m* acting on nose *l* of follower *j*, and with it the bell crank (so called) L. Neither the arm, link, trigger, follower or bell crank are found in the Webster machine, nor does the elbow have any action on the wing. There is really no bell crank in the Ritty and Birch patent, the swinging arm only serving to impart motion in the general direction from the nose of the follower to the point of contact of the arm on the wing.

A bell crank is a device for changing the direction of motion in a plane, while the cam lever in the Webster machine changes the direction of motion to a plane at right angles to that of the impressing motion, so that whether it is considered that the connecting mechanism be the pivots of the wing alone or the combination of this connecting mechanism and the arm, link, trigger, follower and bell crank, or the latter combination alone, the mechanism which serves to operate the supporting rod or bar in the Webster machine, and which operates to disengage the tablet already up, as before stated, in addition to permitting the passage of the rod now

operated upon, is unlike in combination of parts and has a different object from that stated in claim 1 of Ritty and Birch patent.

(Counsel for defendants puts in evidence model marked "Defendants' Exhibit Model Pottin Patent."

Complainant's counsel objects to the introduction in evidence of the above model for the reason that it does not appear to be constructed in accordance with the specification and drawings of said patent, and is therefore incompetent as an illustrative model thereof. Complainant's counsel, also for the same reason, objects to the introduction in evidence of the Ritty and Birch specification model above offered in evidence and referred to in connection with answer to Int. 8. Complainant's counsel further objects to any and all testimony based on said models as being incompetent for the reason stated, and gives notice to defendants' counsel that, on or be-
33 fore the hearing of this cause he will move the court to strike said models and the testimony based thereon from the files of the case.)

Int. 11. Look at the model now shown you, and say if you know what it represents.

Ans. This model, marked "Defendants' Exhibit Ritty and Birch Specification Model," represents a cash-indicating machine operating as described in patent 271,363, Ritty and Birch, page 2, line 85 and onward, where the elbow of the rod is described to aid in pressing back the wing and aided by arm, link, trigger, follower and bell crank.

(Counsel for defendants again offers in evidence the model referred to in last answer, and desires it to be identified by the mark previously placed thereon, viz., "Defendants' Exhibit Ritty and Birch Specification Model, Willard Howland, N. P."

Complainant's counsel repeats his objection to the introduction in evidence of this model for reasons stated above.)

Int. 12. Have you stated in your last answer all that Exhibit Ritty and Birch Specification Model shows?

Ans. The model referred to shows the keys, levers, guides, tablet rods with shoulders or detents, wing, spring, the pivoted arm lying under the keys, together with the mechanism connecting the keys with the wing, as described in the Ritty and Birch patent and shown in drawings, varying only from the drawing in respect to form of the end of trigger, a variation necessary to illustrate the operation of the machine as described in the patent.

Int. 13. Please state whether, in your opinion, the drawing and the specification of the Ritty and Birch patent are consistent with each other, and, if not, in what respects they are inconsistent with each other, and your reason.

Ans. The specification in the Ritty and Birch patent, in respect to the operation of the elbow on the wing and the operation of the bell crank L upon the wing, through the medium of the link, trigger, follower, etc., and the arrangement of those parts shown in the drawing, are not consistent with each other. In the drawing,

the elbow *d* of the rod would have no action on the wing when a key was depressed, as the action of the so-called bell crank anticipates the action which the elbow *d* might have upon the wing.

34 Int. 14. Look at the model now shown you, and say what it represents.

Ans. The model Pottin patent, Willard Howland, N. P., represents a portion of a cash-registering apparatus constructed according to the specification and drawing of patent No. 2076, 1877, comprising the keys, operating tablet rods provided with shoulders or detents, and tablets, and the supporting bar capable of endwise movement and yieldingly held against the tablet rods by a spring, and the mechanism described in said patent whereby upon operating any key the tablet rods before raised are permitted to fall out of view and the tablet last operated upon is held by the supporting bar.

Int. 15. Please state whether the model last mentioned is made in strict accordance with the Pottin patent referred to, and, if not, wherein the variation or variations exist.

Ans. I see no variation in any operating part. In place of the spiral spring to draw back the supporting bar under the shoulder or detent of the tablet rod, a flat spring is used, operating against one of the links from which the supporting bar is hung; this variation does not affect the operation of the model. I also observe that the rods marked *s s'* are shown in the drawing to be bent, while they are straight in the model. The elbow of the tablet rod is shown cut away in the drawing, while it presents a sharp corner in the model. The bending of the arm can have no effect upon the operation of the machine, while the cutting away of the sharp angle in the drawing would probably be more favorable to the action of the machine than the sharp elbow shown in the model. I see no change or variation from the drawing and specification which would tend to favor the action of the model.

(Counsel for defendants again offers in evidence the model referred to in last answer, and desires it to be identified by the marks previously placed thereon, viz., "Defendants' Exhibit Model of Pottin Patent, N. P."

Complainant's counsel repeats the objection before made to the introduction in evidence of this model, for the reasons stated.)

(Cross-examination waived.)

NATHANIEL HILL.

Attest: WILLARD HOWLAND,
Special Examiner.

35 *Deposition of Jerome J. Webster.*

Direct examination by ALBERT M. MOORE, Esq., of counsel for defendants:

Int. 1. What is your name, age, residence, and occupation?

Ans. Jerome J. Webster; forty-eight years of age; residing at

Somerville, Mass.; occupation is devising new mechanical movements and applying them to useful purposes.

Int. 2. Have you ever been connected with the business of manufacturing cash indicators and registers? If so, how long?

Ans. I have been since July, 1886.

Int. 3. Are you familiar with the invention described in Ritty and Birch patent, and do you understand it fully?

Ans. I have examined the Ritty and Birch patent, No. 271,363, dated Jan. 30, 1883, and believe that I understand it as well as it is susceptible of being understood by any one from a careful examination, but I find there are some difficulties in the way of saying that I perfectly understand it, because there appear to me contradictions in itself.

If I should take the drawings in that patent as a basis and produce therefrom that portion of a cash registering and indicating machine which is involved in this issue, and then follow the instructions in the specifications of the patent to produce similar parts, I should have constructed two mechanisms, somewhat different in their mechanical construction as well as in their mode of operation and results.

Int. 4. Have you examined Complainant's Exhibit Defendants' Machine?

Ans. I have.

Int. 5. Do you understand the same?

Ans. I was the original patentee, and I believe the original inventor of the principal combinations which it contains, and I believe that I fully understand the construction and operation of that machine.

Int. 6. In your opinion is the machine, Complainant's Exhibit Defendants' Machine, like the machine described in said Ritty
36 and Birch patent, in respect to the combination of parts expressed in first claim of said patent? Please state your reasons for your opinion.

(Complainant's counsel objects to the question, for the reason that it does not appear from Mr. Webster's testimony, thus far given, that he is qualified to answer the question or otherwise testify as an expert, or that he has had any experience whatever in the examination of patents and the comparison of same with mechanical devices.

Question 6 withdrawn.)

Int. 7. How long have you been engaged in any mechanical occupation, and what mechanical occupation have you been engaged in?

Ans. I have been engaged in mechanical occupations most of the time for twenty years. I have superintended the construction of machines for pulverizing ores, grinding grain, measuring cloth, and cash-registering machines, all of which were my own inventions. I have also superintended the construction of various kinds of electrical apparatus.

Int. 8. What experience have you had in comparing with each

other different mechanical devices from their written or printed descriptions and from drawings of the same?

Ans. My experience in that respect has been principally within the last six years, during which time I have had occasion to and have examined a good many hundred patents upon typewriters, adding machines, signals, cash registering and recording machines, and have compared them with one another and with mechanical structures shown me.

Int. 9. In your opinion is the machine, Complainant's Exhibit Defendants' Machine, like the machine described in said Ritty and Birch patent, in respect to the combination of parts expressed in first claim of said patent? Please state your reasons for your opinion.

(Complainant's counsel makes the same objection to this question as was made to Int. 6, for it does not yet appear from Mr. Webster's testimony that he is qualified to answer the question, for the reason that the question calls not only for a comparison of the specification of the Ritty and Birch patent and the machine described therein with defendants' machine, but also for an
37 analysis of the first claim of the patent and a comparison of said claim with defendants' machine, and it does not appear that the witness has had any experience in such examinations of patent claims and comparison of the same with mechanical devices for the purpose expressed in the question.)

Ans. The first claim in the Ritty and Birch patent is, "In a registering and indicating machine, the combination with a series of indicating tablets operated by a series of keys, of a series of rods, each provided with a detent or shoulder and carrying one of the aforesaid tablets, and a supporting wing with connecting mechanism, whereby upon operating any one of the keys the wing is so moved as to permit the passage of the rod, and whereby upon the release of the key, the wing engages with and holds up the tablet rod and tablet, substantially as described." The supporting wing, referred to in this claim, is shown in the drawing and described in the specifications as a plate or bar pivoted near its lower edge to the frame B and made to oscillate upon the depression of any key which is adapted to move the arm J, and through the medium of the link p and trigger m moves the hanging arm L, called in the specification a bell crank, against the upper edge of the wing I, and presses it back, having its range of motion, or, in other words, the distance which the wing I can be pressed back by the arm L, limited by the stops i. In the machine, Complainant's Exhibit Defendants' Machine, there is no supporting wing, but the tablet rod and tablets are held up by a supporting bar adapted to move endwise against a spring, through the agency of a cam lever, connected with all the keys, and so arranged as to come in contact with a cam attached to said supporting rod as soon as any key commences to be operated, and to become disengaged as soon as the key is fully depressed. This supporting bar is provided with as many backwardly extending projections as there are keys or tablet rods. When a key is

depressed the cam on the cam lever immediately comes in contact with the cam on the supporting bar, so as to move the supporting bar against a spring and the projections from under the detent or shoulder of any tablet rod which had been previously raised, allowing such tablet rod and tablet to fall out of view, that is, to their lowest or normal position, at the same time giving a free
38 passage for the tablet rod corresponding to the key so depressed, and when the key is fully depressed, the two cams are thrown out of contact and the supporting bar is snapped back by the spring against which it had been pressed, so that the backward projection of the supporting bar would be thrown under the detent of the tablet rod corresponding to the last key depressed, and hold up said tablet rod and tablet until another registration is made; while the device shown and described by the Ritty and Birch patent is not adapted to allow a tablet rod and tablet once raised and held up by the wing I to return to its lower or normal position with any certainty through the agency of any mechanism described, which I consider a very fatal defect to the value of any cash registering and indicating machine.

(Complainant's counsel repeats to the answer the objection made to the question.)

(Adjourned.)

JAN. 18, 1889.

Int. 10. Have you ever testified before as a mechanical expert? If so, when and where?

Ans. Yes; twice in the superior court of Canada, in city of Montreal. The first time was for an alleged infringement of an apparatus for reducing grain to meal or flour; the second was in a like controversy between two parties regarding a cloth-measuring machine. The first occasion was about the year 1877, and the second one or two years later.

Int. 11. Please point out the "contradictions" referred to in your answer to Int. 3.

Ans. On the first page of said patent, beginning at line 52 and ending in line 57, it says: "Upon this shaft are hung a series of parallel keys, E, of metal, made heavier in the rear, so as to remain in and return to the position indicated in Fig. 1 by their gravity alone, without the use of springs or other devices;" and I find on the second page of said patent, beginning at line 57, the following: "To return the bar J when the key is released, and to assist the key itself to return, any suitable spring may be employed. We have shown one, *g*, Fig. 2, connected at one end to one of the arms J, and at its other end to the side of the frame B." To my mind these two statements are contradictory, inasmuch as the first says that
39 no spring is required to cause the key to return to its normal position, but that it is done by gravity alone; and the latter provides a spring which the former said was unnecessary.

Again, I find a contradiction between the drawings, Fig. 1, sheet 1, and the specifications, page 2, commencing at line 85: "When any key is pressed down its rod and tablet are raised, and the elbow

d of the rod, in rising, aids in pressing back the wing I." Fig. 1, sheet 1, shows that the elbow *d* could not operate in conjunction with the arm L, and that it would not touch the wing I so as to press it back until it had been raised one-half of the distance, during which time the swinging arm L would have pressed the arm I back so far that the elbow *d* would serve no purpose, except having its lower projecting surface engaged by the upper surface of the supporting wing, so as to hold up its tablet rod and tablet, as shown at *b* in Figs. 1 and 2.

Int. 12. Are you acquainted with the state of the art relating to cash registers and indicators, as it existed Feb. 15, 1882, the time when the Ritty and Birch patent was applied for; and, if so, how did you obtain your knowledge?

Ans. I am acquainted with the state of the art as it then existed, and now exists, so far as I could become so from an examination, made with considerable care, of all the patents which I could find a record of as having been issued in the United States, England and some other foreign countries, for cash registering and indicating machines and similar devices, since the year 1872.

Int. 13. From your knowledge of the state of the art as it existed at the time of said application, what novelty, in your opinion, is disclosed by the Ritty and Birch patent?

Ans. My opinion in that respect agrees with what is stated in the specifications, page 1, lines 24 to 27 inclusive: "The novelty of our invention consists in the construction, combinations and arrangements of the various parts, as will be herewith set forth and specifically claimed." I do not find any further novelty than is here described, that is to say, mechanical construction, combinations and arrangement of parts, which appear to me to be different from any other device shown in any other patent issued either before or since.

The similarity between that part of the mechanism in the Ritty and Birch patent which holds up the tablet rods and tablets and the mechanism shown in the English patent 2076, issued to Henry Pottin, May 28, 1877, is more marked than the similarity of the same mechanism, or mechanism to produce the same result, shown and described in the Ritty and Birch patent and that of defendants' machine.

Int. 14. Please compare Complainant's Exhibit Defendants' Machine, Defendants' Exhibit Model of Pottin Patent, and Defendants' Exhibit Ritty and Birch Specification Model, and point out the differences and similarities which exist between any two or more of them.

Ans. They are all similar in so far as providing mechanism producing one result, that is, holding up the tablet rod and tablet when its corresponding key is depressed; but they are all dissimilar in mechanical construction, combinations, and arrangement of parts.

The dissimilarity between the defendants' machine and the Pottin patent model is chiefly in the mechanical construction, and that the important function of allowing all former tablets to fall out of sight upon the depression of any new key is rendered very much cheaper, simpler and more certain than is shown in the Pottin patent model,

inasmuch as a single mechanism is adapted in defendants' machine to perform with certainty all that separate mechanisms, one for each key, can perform in the Pottin patent model. In defendants' machine the nose of the tablet performs no work, excepting presenting its lower projecting surface so as to be engaged by the upward surface of a backward projection of the supporting bar, while in the Pottin patent model the nose or detent upon the tablet rod does all the work of moving the supporting bar or wing to allow the free passage of a key, and permit all others to fall out of view. The Ritty and Birch model is different in respect to this part of its mechanism to either of the others in its mechanical construction, combination and arrangement of parts, although, like the Pottin patent model, the detent or shoulder, which in the Pottin patent is called the nose, has a portion of the work to do, but the patent says, is aided by the arm L, which rests against the upper portion of the side of wing I; but in this model all the keys can carry up their corresponding tablet rods, and engage the detent thereon
41 with the wing, so as to hold up the tablet rod and tablet without causing the former ones to fall, so that neither the clerk nor customer could at any time be certain which was the last amount registered, and what is described in the patent as one of the most important features of the invention would be lost.

The Ritty and Birch patent, page 2, beginning at line 119, says, "Whenever the same key is successively operated, its rod and the tablet remain up and exposed to view; but when a different key is operated the tablet of the previous one is released and falls back out of sight, and the tablet of the operated key remains up and exposed." This is what the patent says will follow, but the mechanism shown and described in the patent does not produce that result and could not with any certainty unless the detent on every tablet rod was made longer or projected farther back than that of the detent of any other tablet rod, which is obviously impossible.

These differences are what I find in that part of the mechanism which I understand to relate to this issue. There are some new elements contained in defendants' machine not contained or shown in either of the others, one of which is the rack bar which holds any key partially depressed in its position until it is fully depressed. This and other parts of the machine I have not compared.

Int. 15. Do you find in the Exhibit Defendants' Machine any "connecting mechanism" of the same mechanical construction or combining the same parts as are included by the term "connecting mechanism" in the first claim of the Ritty and Birch patent? Please state your reasons for your opinion.

Ans. When I answered the last question I said the mechanical constructions of the two machines were different, and in that respect were both different from the Pottin model. The "connecting mechanism whereby upon operating any one of the keys the wing is so moved as to permit the passage of the rod, and whereby upon the release of the key the wing engages with and holds up the tablet rod and tablet," is found in the pivoting points on which the wing I is supported, in combination with the spring and the detent upon the

rod; or it is the arm J, link p, trigger m, follower j, arm L,
42 or by both. No counterpart of either in mechanical construction, combination or arrangement of parts is to be found in defendants' machine. The sliding bar in defendants' machine, which is adapted to hold up the tablet rod and tablet, the same as the wing in the Ritty and Birch patent, is of a different mechanical construction from the wing; it is operated by a different combination of parts, arranged and operating differently from that shown and described in the Ritty and Birch patent. The supporting bar in defendants' machine is, as I have stated before, operated by a cam lever connected with all the keys instead of that just described as operating the wing in the Ritty and Birch patent.

Int. 16. Look at the model now shown you, and say what it represents?

Ans. It is a model of the tablet rods, tablets, wing and connecting mechanism, made, as nearly as practicable, according to the drawings shown in Figs. 1 and 2, sheet 1, of the Ritty and Birch patent. This model, I think, does not vary from Fig. 1 more than Fig. 2 varies from Fig. 1 on the same sheet; these figures are practically alike, and the model practically like either or both. I mean by practically, that it produces the same results and in the same way that it would produce if made exactly like Fig. 1.

Int. 17. What do you mean by "connecting mechanism" in your last answer?

Ans. I mean all that I described in a former answer as being the connecting mechanism, whether it be taken as the wing I, the pivot f, elbow d, and spring, or the arm, link, trigger, bell crank, arm and follower. The Ritty and Birch specification model is a modification of this one to the extent that would be suggested to a mechanic as necessary to comply, as far as possible, with the specification.

Int. 18. How does the model referred to in your answer to Int. 16 differ from Figs. 1 and 2 of the drawings of the Ritty and Birch patent in respect to the parts shown in said model?

Ans. There is no difference except it be a slight variation as to exact measurements, but not sufficient in any case to produce any difference in result. I think the drawing shows a little more space between the wing I and elbow d, but that difference is very small and immaterial. This model was made by enlarging the drawings
to double their size; and, so far as I know and believe, it is
43 correct within a hundredth of an inch, except as to the space above mentioned, which, perhaps, varies a little more than that.

(Counsel for defendants offers model in evidence, and the same is marked "Ritty and Birch drawings model."

Complainant's counsel objects to the introduction of said model in evidence herein, for the reason that it does not appear to be in accordance either with the drawings and specifications of the Ritty and Birch patent or with the drawings alone of said patent or of any one or more figures of said drawings, and he gives notice to defendants' counsel that he will, on or before the hearing of this

cause, move the court, for the reasons stated, to strike said model and all the testimony based thereon from the files of this case.)

Int. 19. Is the model last introduced operative?

Ans. No, it is not. It will not even hold up the tablet rod and tablet as the nose L holds the wing I from being operated by its spring so as to engage the detents on the rod and hold it up; consequently, the rod not being engaged by the wing immediately falls back by its own gravity, carrying the tablet out of view.

Int. 20. It has been testified in this case "that the defendants' machine is practically two machines, one for cents and one for dollars, each machine having its independent adding mechanism." Is that statement, in your opinion, true; and, if so, how does the defendants' machine compare in this respect with the machine shown in the Ritty and Birch patent?

Ans. In my opinion, that statement is correct, and, upon the same grounds, it is my opinion that the complainant's machine, as shown in the Ritty and Birch patent, is practically twenty machines with twenty separate adding mechanisms, or one for each key.

Int. 21. Will you read your answer to Int. 17, and say whether the parts therein named as constituting the connecting mechanism are correctly named?

Ans. I see no misnomer except the term "bell-crank arm," which is merely a crooked arm pivoted at or near one of its extremities instead of in its angle; it does not here reverse the direction of motion, and consequently cannot, in my opinion, be correctly called a "bell-crank arm."

Int. 22. Is a bell crank used to reverse the direction of motion?

44 Ans. Not necessarily, but to change the direction of motion in the same plane.

Int. 23. In your answer to Int. 17 do you intend to include the wing I as a part of the connecting mechanisms?

Ans. No. That would be a contradiction in itself. I intended to say the pivots upon which the wing turns round.

Cross-examination by EDWARD W. RECTOR, Esq., counsel for complainant:

Cross-int. 24. You are the inventor and designer of defendants' machine, are you not?

Ans. I think so; that is, I believe myself to be the inventor and designer.

Cross-int. 25. Are you interested in its manufacture and sale?

Ans. I am to a certain extent, being a stockholder in the Boston Cash Indicator and Recorder Company, which owns the patents covering the invention?

Cross-int. 26. Are you an officer of the defendant company?

Ans. I am a director.

Cross-int. 27. In your answer to Int. 9 you say, "The device shown and described by the Ritty and Birch patent is not adapted to allow a tablet rod and tablet once raised and held up by the wing I to

return to its lower or normal position with any certainty through the agency of any mechanism described." Will you please explain why, in your opinion, in a machine constructed according to Fig. 1 of the drawings of said patent, a tablet rod which is elevated and held by the wing I, will not be automatically released and dropped to its normal position upon the operation of a second key and the elevation of another tablet rod?

Ans. Because if the detents on the tablet rods were all of exactly the same size, one detent would not press back the wing far enough to insure the release of a former detent, because whatever key was used more than another would commence wearing the wing at the point where the detent of the tablet rod comes in contact with it, and because, even if there was no wear or dust to be provided for, it would be practically impossible to produce mechanism so perfect as that there would not be some lost motion to overcome; that is, something must move the wing I back farther than it is with any certainty moved by the detent of a tablet rod, to insure the release of a tablet rod of the same size which has been engaged and held up by the wing to be released and fall to its lower position.

Cross-int. 28. Then I understand it to be your opinion that to render a device such as that shown in the Ritty and Birch drawings practically operative, it is necessary that there be some means provided for operating the supporting wing, independently of the action of the tablet rods themselves on such wing?

Ans. That is my opinion.

Cross-int. 29. In your answer to Int. 11 you have stated that in Fig. 1 of the Ritty and Birch patent the detents on the tablet rods would not touch the wing in their upward passage, and that the wing would be pressed backward by the bell crank L. I would now repeat my question 27, as that question referred to a device constructed in accordance with said Fig. 1 in the drawings.

Ans. Because the arm L would not if constructed according to the drawings press the wing back far enough to do anything more than allow the elbow of the tablet rod to pass up without leaving any margin for wear or lost motion or imperfections in mechanical constructions, all of which are found to a greater or less extent in every machine. If the arm L should be made of a somewhat different shape so as to press the wing I farther back upon the full depression of the key than the passage of the rod absolutely requires enough to allow for the various defects in mechanical construction and wear, then the tablet rods formerly held up would fall out of sight.

Cross-int. 30. Then it would seem to be a matter of adjustment of the bell crank L and its associate mechanism whether said bell crank would push the wing I back far enough to release the previously elevated tablet rod, would it not?

Ans. I do not see how the part as shown could produce that result, but I readily see how the lever L could be so changed in its shape and proportions as to produce that result, through or by means of its associated mechanisms.

Cross-int. 31. Then, as shown in the drawings, you think the bell crank L would push the wing I back far enough to permit
46 the detent of the ascending tablet rod to clear it, but would not release the previously elevated tablet rod whose detent rested on the wing?

Ans. Yes; that is what the drawing shows, in my opinion.

Cross-int. 32. Do you find in the Pottin patent, referred to in your direct examination, any mechanism for operating the supporting bar other than the detents on the tablet rods themselves?

Ans. There is no other except the spring which returns it to its normal position after having been operated by the nose on the tablet rod.

Cross-int. 33. Do you consider your machine (the defendants') to be an important improvement over the Pottin machine in this respect?

Ans. I consider the defendants' machine embodies an important improvement over the Pottin machine, inasmuch as it is simpler and cheaper in construction, consequently more certain in its operation and less liable to get out of order, having less parts to be worn or to get disarranged. The Pottin machine requires a special device for each key upon which the nose of the tablet rod acts to move the supporting bar, while in defendants' machine one cam lever and two cams produce this result.

Cross-int. 34. The defects and disadvantages which you have pointed out in the Pottin machine are entirely overcome in defendants' machine, are they not, by the employment in the latter machine of independent mechanism for operating the supporting bar?

Ans. The Pottin machine is not to my mind defective in its operation, if properly constructed and kept in order; but, in my opinion, it would be more expensive to construct and more liable to get out of order than defendants' machine, on account of its having separate mechanisms for each key.

Cross-int. 35. You have pointed out certain disadvantages in the Pottin machine which are overcome in your machine, and have stated that the latter is simpler and cheaper in construction, and more certain in operation, than the Pottin machine; and I ask whether or not, in your opinion, the advantages in this respect of your machine over the Pottin are due in a large measure to the employment in your machine of the independent mechanism for operating the supporting bar?

47 Ans. Yes; the cam lever and two cams in defendants' machine take the place and do all the work performed in the Pottin machine by separate mechanisms for each key, which I consider one of the chief advantages in this respect.

(The witness here refers to his answer to cross-int. 32, for the purpose of making a correction in, or addition to, his answer given to that question, and says:—)

There is attached to the supporting bar and forming a part thereof, a counter-weighted, pivoted lever for each tablet rod; also

a projection upon said supporting bar for each tablet rod. The counter-weighted lever is adapted to fall to, and to remain in, its normal position by gravity alone, but the counter-weighted end is not sufficiently heavy to support a tablet rod when released from the projection, so as to strike the other end of the lever.

Cross-int. 36. As I understand you, however, you do not find in the Pottin machine any mechanism connecting the operating keys with the supporting bar, for operating said bar independently of the movement given it by the tablet rods themselves?

Ans. No, and I have so stated in my examination-in-chief.

(Adjourned.)

JAN. 19, 1889.

Cross-int. 37. What do you consider to be the connecting mechanism referred to in the first claim of the Ritty and Birch patent?

Ans. The pivots to the wing and its spring combined with the detents upon the tablet rods would be a connecting mechanism, which is shown in the drawings of the patent, and would be sufficient to produce the result called for in the first claim. The arm J, the link *p*, the trigger *m*, the bell-crank arm L, follower *j*, would also be a connecting mechanism, which is shown in the drawings of that patent, and in my opinion would likewise produce the same result, whether working independent of the other or as far as practicable in conjunction with it.

Cross-int. 38. Which of these two sets of mechanism is, in your opinion, the connecting mechanism referred to in the first claim of the patent?

Ans. I must say, as did Mr. See, a former witness in this
48 case, that the patent does not sufficiently define what is meant by "connecting mechanism," to be able to give an opinion as to what was meant by the term "connecting mechanism," except by considering the results which it was required to produce; either of these would, in my opinion, do the work.

Cross-int. 39. In answer to cross-int. 28 you have stated it to be your opinion that, in order to render the device shown in the Ritty and Birch drawings practically operative, it is necessary that some means be provided for operating the supporting wing, independently of the action of the tablet rods themselves on said wing. Assuming now that the first claim of the patent should be construed to cover a practically operative device, provided its language will permit such a construction, which of the two mechanisms you have described would you consider to be the "connecting mechanism" referred to in the claim?

Ans. If claim first of Ritty and Birch patent, where it says, "whereby upon operating any one of the keys the wing is so moved as to permit the passage of the rod, and whereby upon the release of the key the wing engages with and holds up the tablet rod and tablet, substantially as described," should be interpreted as describing an operative machine, then the last-described mechanism, to wit, arm J, link *p*, trigger *m*, bell-crank arm L, and follower *j*, in combination with the detent upon the tablet rod, would be, in my

opinion of the mechanism, the connecting mechanism referred to in the claim. The description of the swinging arm L is, in my opinion, incorrect in the patent, as I have stated in my examination-in-chief. In my answers now I call it a bell-crank arm, because it is so nominated in the patent.

Cross-int. 40. Do you find in the Pottin patent any mechanism whatever which corresponds, either in its construction or in its mode of operation, with this connecting mechanism of the Ritty and Birch patent?

Ans. The mechanical constructions of the two are very different; the combination and arrangement of the parts are also very different; but the result claimed in the first claim of the Ritty and Birch patent is produced by the Pottin patent, although the
49 operation by which the result is produced is different from that of the Ritty and Birch patent.

Cross-int. 41. I did not ask your opinion as to the similarity or dissimilarity of the general results accomplished by the Ritty and Birch and by the Pottin patent, regardless of the means for accomplishing those results, but what I want to know is, whether in your opinion, the Pottin patent exhibits any mechanism which corresponds, either in its construction or in its mode of operation, with the connecting mechanism of the Ritty and Birch patent as defined by you above?

Ans. No; except the detent on the table rod.

Cross-int. 42. If the specifications and drawings of the Ritty and Birch patent were placed before a mechanic skilled in the art relating to the cash registering and indicating apparatus, and he were instructed to produce therefrom a practical machine which would operate in the manner described in the patent, would he, in your opinion, produce a device like either the Defendants' Exhibit Ritty and Birch Specification Model, or the Defendants' Exhibit Ritty and Birch Drawings Model?

Ans. I think he would at first produce a machine like the Ritty and Birch specification model, if both were placed before him. But if he fully understood what was required to make a practical cash registering and indicating machine, he would discover that the shape and proportions of some of the parts would have to be changed, and would not require a very great amount of mechanical talent to make the necessary changes if he, in the first place, knew what was needed.

Cross-int. 43. It is to be presumed, is it not, that a mechanic skilled in the art relating to cash registering and indicating apparatus would have such general knowledge of what was needed to make a practically operative machine?

Ans. Yes; and he would have produced that by producing such a machine as that shown by Ritty and Birch specification model. But while it would be practically operative, it would also be practically worthless as a part of a cash registering and indicating machine, and a great majority of the best mechanics have
59 very little knowledge of what the public require of a cash registering and indicating machine.

Cross-int. 44. I presume that you are aware that the specifications and drawings of a patent are not addressed to mechanics generally, but only to mechanics skilled in the art to which the patented device most nearly relates, and that in the present instance the specifications and drawings of the patent were addressed only to mechanics skilled in the art relating to cash registering and indicating apparatus. With this explanation, I would ask you whether or not in your opinion, if the drawings and specifications of the Ritty and Birch patent were placed before such a mechanic, he would, with the ordinary exercise of the skill of his calling, be able to produce therefrom a practical machine, operating in the manner described in the patent?

Ans. I was not aware that the drawings and specifications of a patent were not addressed to all good mechanics capable of understanding both and of producing what was shown by the drawings and described in the specifications; not, however, confining himself strictly to drawings in a patent but varying from them as the specifications would seem to indicate. According to explanation given, I should think a good mechanic, who also had a somewhat inventive turn of mind, would supply the deficiencies of the drawings and specifications of the Ritty and Birch patent; that is to say, I think they go far enough to suggest to the mind of a good mechanic the necessary changes.

Cross-int. 45. Who made the model heretofore offered in evidence herein, and marked "Defendants' Exhibit Ritty and Birch Drawings Model"?

Ans. Samuel Libby.

Cross-int. 46. Under whose directions and instructions?

Ans. No one, except myself; and I had no occasion to give him instructions, except as to finish and giving him some advice or instructions as to the number of keys to be used, and to bend the tablet rods as shown in the drawing, instead of a detent as he did in the specification model. I also, from time to time, verified his measurements.

Cross-int. 47. I believe you have testified in your direct
51 examination that this model is made in strict accordance with the drawings of the Ritty and Birch patent, on a scale twice the size of said drawings, and that the proportions of the various parts are correct to within one one-hundredth of an inch; am I right?

Ans. I said that I believed this to be the case; I believe it now, and shall continue to do so until some one demonstrates to me that I am mistaken, except in respect to the open space between the detent of the tablet rod and the wing, which I then said, and now think, is somewhat more than one one-hundredth of an inch different.

Cross-int. 48. Will you please examine the model again, and state whether you do not find that the space between the lower side of the bar K, or its supporting side arms, and the base of the machine, instead of being twice the distance between said parts in the drawings, as it should be to correspond with the enlarged scale upon which the model is built, is only about the same distance as it is in

the drawings, and therefore only one-half what it should be in the model?

Ans. That is only space under the model which was left exactly correct, so as to produce the same result, and at the same time that N does in the drawings, *i. e.*, the range of motion of the keys in the model is, so near as I can measure, just twice what is shown in the drawings; and so long as that condition is preserved, it makes no difference how much or little space there is under the presser bar.

Cross-int. 49. Then, in respect to the actual distance between the under side of said bar and the base of the machine, the model does not correspond to the scale or proportions, of the drawing to within one one-hundredth of an inch, nor, indeed, to within ten one-hundredths of an inch. Is this not a fact?

Ans. The space between the bar and the base, I believe, in the model is materially less than twice that shown in the drawings, but that space is no part of the model and has no more to do with it than the thickness of the base upon which the model is placed, so long as the keys have their proper range of motion, which they have in the model, according to the drawings, in my opinion.

Cross-int. 50. Does not this space in the model limit the downward play of the front ends of the keys, and consequently the upward play of their rear ends and the upward play of the
52 tablet rods, as well as control the extent of movement of the bell crank L and the wing I?

Ans. Yes, it limits both motions, but leaves both sufficient for what the drawings call, or very nearly that, being about the thickness of the rear end of the key short.

Cross-int. 51. What do you find to be the extent of movement of the rear end of keys in the drawing?

Ans. About nine-sixteenths and one thirty-second of an inch, *i. e.*, nineteen thirty-seconds of an inch.

Cross-int. 52. What do you find to be the extent of the corresponding movement of the keys in the model?

Ans. Twenty-nine thirty-seconds of an inch.

Cross-int. 53. What do you find to be the extent of the vertical movement of the tablet rods in the drawing?

Ans. Nearly seventeen thirty-seconds of an inch.

Cross-int. 54. What do you find to be the corresponding movement of the tablet rods in the model?

Ans. Twenty-six thirty-seconds of an inch.

(Defendants' counsel, by consent of counsel for complainant, withdraws from evidence herein the model marked "Ritty and Birch drawings model," and it is agreed that no argument is to be based by either party on any testimony relating to said model.)

Cross-int. 55. I understand from your direct examination that the Ritty and Birch specifications model heretofore offered in evidence is intended to correctly represent the several parts it contains when they are constructed and arranged to operate in the manner described in the specifications and the first claim of the Ritty and Birch

patent, as distinguished from a model constructed in accordance with the drawings of said patent; am I correct?

Ans. Yes; that is to say, the detent on the tablet rod aids in pressing back the wings, so that the tablet rod may have a passage by its own force and that of the bell crank L, so that the wing engages the detent and holds up the tablet rod and tablet.

Cross-int. 56. Then I understand from your above answer and from your direct examination as well, that the principal point which this model is designed to illustrate is such an organization and arrangement of the parts of the machine it represents as that
53 the bell crank L and the detent on the tablet rod will aid each other in pressing back the wing I to permit the passage of the tablet rod; that is, that the bell crank and the detent on the tablet rod will act in unison all the way and each do part of the work of pushing back the wing I; am I correct in this?

Ans. Yes; so far as it is practical to make the two parts act in unison.

Cross-int. 57. Will you now please carefully examine this model and operate each one of its keys, and state whether or not you find that the bell crank does any part of the work of pushing back the supporting wing in connection with the operation of any one of the keys?

Ans. Yes; I do.

Cross-int. 58. Which one of the keys?

Ans. Key 25.

Cross-int. 59. Will you now please carefully operate key 25 again, and see if you do not find that the detent of its tablet rod does all the work of pushing back the wing and that the bell crank does none of it?

Ans. Yes; upon a careful examination it appears to me that the detent on the tablet rod corresponding to key 25 operates upon the wing before the bell crank quite touches it, and leads the bell crank the whole distance, as must be always the case, that one or the other will lead unless something elastic is applied to insure the pressure of each one all the while.

Cross-int. 60. Then, in the case of key 25 of the model, as the detent of the tablet rod leads the bell crank in the operation of pushing back the supporting wing, said bell crank does not do any of the work of pushing back the wing upon the operation of that key?

Ans. No; it does not, and would not until the detent or wing, one or both, was sufficiently worn to permit the nose of the bell-crank arm to come in contact with the wing at the same time as the detent. This is true of all the other keys, each of which I have examined with the same care as I did key 25.

Cross-int. 61. Then, under the present construction and operation of this model, the detents of the tablet rods perform all the
54 work of pushing back the wing and are not assisted by the bell crank; is that correct?

Ans. Yes; I said so in my last answer.

Cross-int. 62. I understand from your answer to cross-int. 59 that

it would be difficult to so adjust the parts as that the bell crank and the detent would act together on the wing and assist each other in pushing it back, and that one or the other will always lead "unless something elastic is applied to insure the pressure of each one all the while;" am I correct?

Ans. Yes. I consider it so difficult that it would be practically impossible; that is, no one wanting a cash register and indicator would be willing to pay for such exactness and perfection of workmanship as would be required to produce this result. If a spring was placed on the wing back of the nose of the bell crank L, then the bell crank might assist the detent to the extent of the strength of such spring.

Cross-int. 63. It being, in your opinion, difficult and perhaps impossible to so adjust the parts as that the bell crank and detents shall act in unison on the supporting wing, I will ask you what, in your opinion, would be the operation of the model if the bell crank were arranged to lead the detents instead of the detents being arranged, as they are in the model, to lead the bell crank in the work of pushing back the wing?

Ans. In my opinion, it makes no difference which does the work, unless the bell crank not only led the detent in pushing back the wing, but also carried the wing farther back than the detent possibly could, if so constructed that they work in unison.

Cross-int. 64. In the model, the detents do all the work of pushing back the wing; now if the bell crank in said model were arranged to do all the work of pushing back the wing, would not said model, in your opinion, operate in the manner set forth in the specification; that is to say, "after a key had been operated and its tablet exposed to view, such tablet would remain up and exposed until another key was operated, whereupon the first would fall back out of view and the second remain exposed, and so on, thus always keeping in view the key last operated"?

Ans. Yes; if the bell crank led the detent sufficiently,
55 that would be the result; but if the bell crank only led the detent as much as the detent leads the bell crank in this model, I do not think that result would be produced with any certainty.

Cross-int. 65. From your knowledge of and familiarity with defendants' machine, as the inventor and designer thereof, is it your opinion that the indicating mechanism of said machine would be practically operative if the cam lever and cams were dispensed with, and the detents of the tablet rods alone depended on to actuate the supporting bar?

Ans. Not with any certainty.

J. J. WEBSTER.

Attest: WILLARD HOWLAND,
Special Examiner.

Defendants' counsel give notice to complainant's counsel that the testimony on behalf of the defendants is now closed, and in this

connection asks complainant's counsel if he will press for a decree on any other claim of the Ritty and Birch patent than the first one.

Complainant's counsel replies that he will not ask for a decree on any other claim.

Evidence for Defendants.

Taken pursuant to the sixty-seventh rule of the Supreme Court of the United States, in equity, as amended, before me, John H. Morison, special examiner.

BOSTON, *Oct.* 29, 1889.

Present: Edward W. Rector, Esq., of counsel for complainant; Frederick P. Fish, Esq., of counsel for defendants.

Deposition of James Shepard.

Direct examination by FREDERICK P. FISH, Esq., of counsel for defendants:

Int. 1. State your name, age, residence, and occupation.

Ans. James Shepard; fifty-one; New Britain, Conn.; so-
56 licitor of patents, and I am also frequently called upon to testify as an expert in patent causes.

Int. 2. What experience have you had with mechanisms, and especially in examining and comparing mechanical devices with the view of determining their mode of operation and the particulars in which such devices resemble or differ from each other, and what experience have you had in matters relating to letters patent, and as an expert in patent causes?

Ans. I was formerly a mechanic and worked in a machine shop, and as a machinist in other shops, for a period extending over about twelve years. I have been a solicitor of patents ever since 1866, and have continuously, from day to day, had occasion to compare mechanical devices with each other and with letters patent, with a view of ascertaining their differences or resemblances. During the last sixteen years I have frequently each year testified as an expert in patent causes.

Int. 3. Have you read letters patent No. 271,363 to Ritty and Birch, upon which this suit is brought; and, if so, do you understand the same and the construction and mode of operation of the devices shown and described?

Ans. Yes, to both branches of the question.

Int. 4. Describe generally the construction and mode of operation of the cash register and indicator of the Ritty and Birch patent, and in detail those portions of the apparatus referred to in the first claim, stating what mechanism or combination of mechanism you understand to enter into the structure of that first claim.

Ans. The patent is for an improvement in cash registers and indicators. In general, the machine consists of a series of keys, having designated thereon certain denominations to represent certain amounts of money, which keys are without the case; a series of

tablets connected with said keys, for indicating to the purchaser an amount corresponding with that on the keys, so as to indicate to customers which key is operated; and within the case, not visible to the purchaser or operator, certain registering mechanisms for recording or registering the amount that is represented by the keys which have been operated. In so far as the registering mechanism is concerned, there is a series of mechanisms or machines,
57 one machine for each key; but the mechanism for indicating the amount registered at each operation is a single machine.

The first claim refers only to the mechanism for indicating the amount of the sale to the purchaser, and the specification clearly separates this part of the machine from the rest, the description of which ends with line 125 on page 2.

The specification says: "Our invention relates to an improvement in cash registers and indicators designed for the use of storekeepers and others as a means of accurately registering the total cash receipts for any given period of time, as a day, for instance, and for indicating to the customers that the amount paid has been registered by disclosing to their view such amounts upon figured tablets.

The arrangement of the parts and operation of the machine are such that no tablet can be exhibited without its value being counted upon the registering mechanism, and whenever any tablet is disclosed it remains so until the machine is operated to disclose a second tablet."

This I understand to be the ordinary recital of the old and well-known class of machines existing in the prior art, upon which class of machines the patentee has attempted to make an improvement. The arrangement and operation of the parts in the last paragraph quoted, I understand to be not those which are peculiar to this patent, but they are the arrangement of the parts and mode of operation which the patented machine has in common with the prior machines in the same class and to which the invention relates.

From this statement it will be seen that whatever novel result there is in the patented machine must be found in those features which it does not possess in common with the prior machines of its class as thus specifically set forth.

After this statement of the prior class of the machines, the specification says: "The novelty of our invention consists in the construction, combinations and arrangements of the various parts, as will be herewith set forth and specifically claimed."

The first claim refers to five elements in a registering and an indicating machine, which are as follows: First, a series of
58 indicating tablets; second, a series of keys for operating said tablets; third, a series of rods; fourth, a supporting wing; and fifth, a connecting mechanism.

As in other registering and indicating machines, there is a suitable box or case containing a suitable frame-work upon which to mount the parts, and an opening or window through which to exhibit the indicating tablets. The series of rods referred to in said

first claim are a series of vertical rods arranged side by side so as to form one straight row, and one only, across the machine. Each of these rods rests upon the rear end of a lever key, said keys being arranged side by side so as to operate individually the individual rods of the series. Each rod is also provided with a detent which projects rearwardly, the upper side of which is inclined to serve as a wedge, and the under side of which is more abrupt to serve as a holding shoulder. These detents not only project rearwardly, but they stand side by side, and the series of them form a single row only, which is adapted to be engaged and supported by a plain, straight-edged wing. The series of indicating tablets are figured tablets, one of which is attached to each of the rods in the series, and they are operated by the keys through said rods. When the rod is depressed, they are out of sight, and when the rod is elevated its tablet is brought into view in front of the window. Now, these tablets are combined with the series of rods in a peculiar manner as shown in Fig. 4, so that while the rods stand side by side in a single row, the tablets may overlap one another and form several rows. This peculiar combination is effected by having part of the tablets secured in alignment with the rods and part of them offset to throw them out of alignment with the rods, some of them being offset to the rear and some of them to the front.

The supporting wing of the claim is shown and described in the patent in the form of a broad, flat plate with a plain, straight upper edge, pivoted in the rear of the series of rods so as to incline forwardly, with its upper edge resting against the rear sides of the upper portions of the rods. It is long enough to engage the back of all the rods, and is free to vibrate on its pivots substantially from rear to front and transversely to the row of rods; and it is held in contact with the rods by means of a spring, which is secured to one
59 end of the wing and the frame. No particular advantage is specifically set forth in the patent for this wing, nor for any of the other parts of the tablet-indicating mechanism; and therefore its advantage and their advantage must be determined by an examination to discover the functions or advantages which are inherent in said wing or other particular device. Now, the apparent advantages of such a wing are these: The rods can all be arranged in a single row only, with a single row of rearwardly projecting shouldered wedges; and they can be pressed upon with friction to hold them all in place and to engage the shoulder of any shouldered wedge by means of a plain, straight-edged device, whose movement is transverse to the row of rods. This is about as simple as any device can be, and it is also a very inexpensive structure, being free from all irregular projections or other devices of a complicated nature that would be expensive to form or attach, and perhaps be liable to get out of order when formed or attached.

An advantage of pivoting the wing, in contradistinction to making it slide from front to rear, is its ease of working, and particularly to make both ends of it move in unison as it oscillates backward and forward, so that it may be pulled upon or pushed upon by a spring or other device at either of its ends, without any tendency

to bind and cramp so as to interfere with its forward and backward movement.

The connecting mechanism mentioned in the claim is described in the patent as consisting of two mechanisms having a joint action. First, each individual key operating an individual rod brings the shouldered wedge against the forwardly inclined side of the oscillating wing, and pushes the wing backwards in a direction transversely to the series of rods by means of its wedging action; and second, a series of levers, connecting link and trip, which, under the influence of any key of the series, will press upon one end of the wing and force it backward by a direct push, in contradistinction to a wedging action. This pushing mechanism consists of a lever pivoted at each end of the series of keys, a connecting bar extending from one lever to the other and underneath all the keys, a link p, Fig. 1, which connects the upwardly projecting end of one of said side levers with another lever which bears against a swinging trip, called in the patent "a follower j," which trip bears upon a pendent angle lever, called "a bell-crank tripping arm L" in the specification. The end of this pendent lever L bears against the forward side of the wing at one end, so that when any of the keys are operated, the wing I is pushed rearwardly by the individual wedge connected with the individual key operated, and also by the direct action of the pendent lever L, through the action of the same key.

The general operation is, that when a key is depressed the individual rod of that key will be carried above the upper edge of the wing, and as the wing comes forward it engages the shouldered portion of the wedge or detent and holds that tablet up to view. After one tablet has been thus raised, or two or more tablets simultaneously raised, to indicate a certain amount, then upon operating any one of the keys the wing is moved rearwardly so as to permit the passage to a point above its upper edge of the shouldered wedge of the rod or rods next raised, and also to push said wing back far enough to permit of the downward passage by the wing of the shouldered wedges of the rod and tablet, or rods and tablets, that were before held up by the wing.

Now, it is not clear from this specification exactly how the operations of the individual wedges in pushing back the wing with the wedging action, and the angle lever which pushes it back by a direct action, are timed. Neither is there anything in the specification to intimate that the angle lever L pushes the wing back to any greater extent than do the individual wedges. But whether it does or not, and no matter how the conjoint operation of the two connecting mechanisms is timed, it is clear from the specification that their action is a joint action, and that they both co-operate in pushing back the wing. The specifications says: "Now, the operation of this much of the machine is as follows: When any key is pressed down its rod and tablet are raised, and the elbow d (the shouldered wedge) of the rod, in rising, aids in pressing back the wing I; but to aid the elbow the arm J on the right, which, as before explained, is drawn forward whenever a key is pressed, imparts motion to the

link *p* and trigger *m*, whose upper end, acting on the nose *l* of the follower *j*, presses it back, and with it the bell crank L, which is thus forced against the wing and presses it back."

61 The matter in parentheses is not quoted.

In addition to the enumeration of the elements in claim 1, there is a recital of the functions of the combination referred to, which is as follows: "Whereby upon operating any one of the keys the wing is so moved as to permit the passage of the rod, and whereby upon the release of the key the wing engages with and holds up the tablet rod and tablet substantially as described."

I understand this recital of the function to be in the nature of a limitation to indicate that the claim is not broadly for the combination of the elements enumerated, unless said combination operates in the manner specifically pointed out in this recital. Beginning with line 21 on page 2 of the specification, I find these words, "Now, it is an important feature of our machine, that after a key has been operated and its tablet exposed to view, such tablet should remain up and exposed until another key is operated, whereupon the first falls back out of view and the second remains exposed, and so on, thus always keeping in view the tablet of the key last operated. To effect this result we pivot, by means of trunnions or a shaft extending between the sides B, a forwardly inclined wing I, pivoted at its lower edge, as at *f*, and resting at its upper edge against the rear sides of the upper portions of the rods F."

I understand that this holding up and releasing the tablets is not a novel feature with this machine, although it is important, because the class of machines to which the invention relates has this feature in common with the machine of this patent, and the novelty of the latter machine resides in the means by which this old result is effected.

In this connection it should be noticed that the important feature of the machine in the language last quoted and in the recital of the class to which the invention relates are very different from the recital of the function in the first claim. These former machines, which appear to be old on the face of the patent, must have had a device of some kind for holding up the tablets, and they must have had a series of tablets, and a series of keys, and a series of devices for supporting the tablets, and mechanism for operatively connecting the parts; and I understand from the patent that the general result

62 of the machines in the prior class is such that upon operating any one of the keys the holding device is so moved as to permit the passage or movement of the device for supporting the tablet; and that upon the release of the key the holding device engages with and holds up the tablet support and tablet; and the recital in claim 1 differs from this old operation in pointing out more fully the particular operation of the wing in contradistinction to a holding device in general, and also the relation of said wing to the rods.

In brief, the mechanism referred to in the first claim may be said to consist of the combination of a series of keys, a series of rods, each provided with a shouldered wedge, the bodies of the rods being

arranged in a single lateral row and with a row of rearwardly projecting wedges; a series of tablets connected to said row of rods and arranged in several lateral rows; an oscillating pivoted wing with its upper edge pressed against all the rods in the series by a spring, its upper edge being a simple straight-edged device which moves transversely to said row of rods to engage and disengage the shoulders of the several wedges, and two sets of connecting mechanisms, whereby upon depressing any one of the keys, the wing is moved backwardly by the conjoint action of an individual wedge acting with a wedging action, and another device which acts to push the wing directly backwards without such wedging action, whereby said wing will hold up and let fall the tablets last raised and the ones that were previously up, respectively.

Inf. 5. Have you read Exhibit Pottin Patent (British patent No. 2076 of 1877) and Defendants' Exhibit Campbell Patent (No. 253,506, Feb. 14, 1882), and do you understand the same and the construction and mode of operation of the devices therein shown and described? If so, state how the tablet-operating mechanism of those two patents resembles or differs from the corresponding mechanism of the Ritty and Birch patent referred to in the first claim thereof.

Ans. I have examined said patents, and understand the construction and mode of operation of the mechanisms therein described, having given more particular attention to the tablet-operating mechanism. The machines of both of these patents are of the class referred to as old in the Ritty and Birch patent in the recital of the class to which the invention relates, and "the arrangement of the parts and operation of the machine are such that no tablet
63 can be raised without its value being counted upon the registering mechanism, and when any tablet is disclosed it remains so until the machine is operated to disclose a second tablet." In other words, "after a key has been operated and its tablet exposed to view, such tablet shall remain up and exposed until another key is operated, whereupon the first falls back out of view and the second remains exposed, and so on, thus always keeping in view the tablet of the key last operated." The machine of each of these patents has a suitable case provided with a window or windows, and each machine is a registering and indicating machine. Each of these machines has a series of indicating tablets, a series of keys, a series of rods or slides carrying one of said tablets, a holding device for holding up the tablets, and connecting mechanism, whereby upon operating any one of the keys the holding device is moved to permit the passage of the detent, and whereby upon the release of the key the holding device engages with and holds up the tablet substantially as described in the Ritty and Birch patent and referred to in the first claim thereof, provided the same is construed broadly to cover the general combination of the parts recited, and so as to include a holding device in general instead of a supporting wing. In fact, the registering and indicating machine of the Pottin patent is one that comes within the exact terms of the first claim of said Ritty and Birch patent, excepting that in place of

the supporting wing it has a supporting bar, and in that the particular mechanism is not the dual connecting mechanism of said Ritty and Birch patent.

Referring now more specifically to the Pottin patent, which shows and describes two forms of machines. The one most closely resembling in its indicating mechanism that of the Ritty and Birch patent is illustrated on sheet 2 of the drawings, and is the second machine described in the specification. It has a series of keys outside of the case, and inside the case a series of vertical rods arranged side by side laterally in two sets of a single row each, the keys being arranged in corresponding sets. Each rod is provided with a laterally projecting shouldered wedge, and at its upper end with a tablet bearing numbers corresponding with those on the keys. The rods and the key levers are so connected that upon the depression of any key its particular rod and tablet are raised, the latter being
64 brought into view in front of the window. In connection with each row of rods and tablets is a shouldered bar suspended from pivoted links so that it may move longitudinally by swinging on said links. Each bar is also provided with a spring for pulling it longitudinally in one direction. The bar is also provided with a series of weighted latches or trips, one for each rod, the short end of which trip projects a little beyond each projection on this longitudinally moving bar.

Now, when any key is operated it throws one of the tablet rods upwardly and the incline of the shouldered wedge engages the projecting end of the trip, and under the wedging action of said rod and wedge the bar is moved longitudinally against the force of its spring, and as the shouldered wedge passes above the bar, and as the key is released to let the rod fall, the shoulder catches on a projection on the bar so as to hold up the tablet rod and tablet. When any other of the keys are operated, its shouldered wedge acts in the manner before described on another trip of the bar to move said bar endwise against the force of its spring, and as soon as the projection on the bar is pushed out from under the shoulder of the tablet rod before thrown up, the rod falls, and striking the projecting end of the trip, knocks said trip down out of the way, and the tablet rod and tablet fall out of sight, the weight of the tablet and tablet rod being sufficient to move the trip; and, after the rod has fallen, the trip resumes its normal position by gravity. These trips on the bar so connect the several tablets, keys and their connections that the bar is moved endwise a greater distance than it would be if each wedge acted directly on a rigid portion of the bar.

In the general mode of operation the machine of this Pottin patent is the same, in so far as the indicating mechanism is concerned, as that of the Ritty and Birch patent. That is to say, if the two machines were boxed up and placed side by side, and the keys operated to throw up a tablet or tablets, no one could tell the difference in the operation of the two machines, because in each, on the depression of any key in the set, a tablet would be thrown up, and a tablet previously thrown up and held up would be dropped. The same general mode of operation is also present in the Camp-

bell patent, but the mechanisms are different in each. The
65 indicating mechanism of the Pottin patent resembles that of the Ritty and Birch patent in the fact that the supporting device for the tablets is moved by the means of a shouldered wedge or detent; but it differs from the indicating mechanism of the Ritty and Birch patent in that the tablets are all in alignment with their rods; that the shouldered wedges project laterally instead of rearwardly; in that it has no supporting wing hung on pivots so as to move backward and forward transversely to its row of tablet rods; and that there is no dual mechanism for acting conjointly to move the holding device by a wedging action and by a direct push.

It is also clear that this mechanism of the Pottin patent moves the holding bar a greater distance than it could be moved by wedges acting upon a part rigidly connected with said bar or made rigid therewith; and it is not clear that the supporting wing of the Ritty and Birch patent is moved farther than it would be by the wedge of one of the keys acting on a rigid part thereof.

In the Campbell patent the tablets are of themselves vertical slides, and they are each provided with a finger or detent that engages a holding device in the form of a series of swinging hooks, connected by a longitudinally moving bar, which is forced in a direction to carry the hooks into engagement with the fingers of the tablet slides by a spring. Its detailed mechanism is not so near like that of the Ritty and Birch patent as is that of the Pottin patent. They each of them have a holding device for accomplishing the same general result of holding up and releasing the tablets when any key is operated; but they do not, in my opinion, either of them, have the supporting wing of the Ritty and Birch patent, nor a connecting mechanism that has the conjoint operation of two differently acting mechanisms for moving the tablet-supporting device, nor any equipment for either said wing or connecting mechanism.

Int. 6. Look at the Exhibit Model of Pottin Patent now shown you, and state how far it illustrates the indicating mechanism of the Pottin patent.

Ans. Three of its tablet rods do not at present have tablets upon them, and the tablets on the other two rods are not figured. It cor-
66 rectly illustrates the manner of raising and dropping the tablets and tablet rods through the action of its keys, which is shown and described in the corresponding parts of the Pottin patent.

Int. 7. Have you examined Complainant's Exhibit Defendants' Machine, here in evidence, and understand the construction and mode of operation of the same? If so, describe it generally, and describe in detail the mechanism by which the indicators are operated.

Ans. I have and I do. This machine is a cash indicator and register, and it contains two groups of keys, one for indicating cents and the other for indicating dollars and half dollars.

It has, at present, combined with one group of keys a registering mechanism for recording the amounts registered in multiples of

five cents, and I presume there was another registering machine for the other group of keys. As relates to its tablet indicating mechanism, it constitutes but a single machine, for each individual key in each group is operatively connected with the indicating tablets for both groups of keys.

The keys are lever keys, and on the rear end of each key lever there rests a vertical tablet rod, supported in suitable guides. These tablet rods are arranged in four different rows which extend laterally across the machine, and each tablet rod is provided with a forwardly projecting pin beveled upon one side and made substantially horizontal on its under face. At the upper end of each rod there is an indicating tablet in alignment therewith. Extending laterally across the entire machine there is a longitudinally sliding bar, having two downwardly projecting arms, at the lower end of which there is a forwardly projecting stud. The sliding bar is provided with as many rearwardly projecting studs as there are vertical rods, and these projections are of different lengths, so as to engage the forwardly projecting pins in the several rows of tablet rods. There is also a spring attached by one end to the frame and by its other end to the sliding bar, so as to pull said bar endwise to the right. Extending across the top of each group of keys there is a plate whose axis is the same as that of the key levers, and which is moved or oscillated on its axis whenever any key in its group is operated to throw up a tablet rod. At the left-hand end of each plate there is a laterally projecting pin. Immediately in the rear of this pin is a stationary standard upon which is pivoted an
67 angle lever in such manner that it may not only move upon said pivot as an axis, but also that it may rock or tip upon its axis. The lower member of this angle lever is slotted, and engages the pin on the swinging plate. A spring is also attached to the lower end of said angle lever, in a somewhat oblique position, so as to pull that member both rearwardly and laterally. The upper member of the angle lever has a cam or wedge for engaging the forwardly projecting stud, which I have before referred to, as on the downwardly projecting arms of the sliding bar.

The operation is such that when any key is depressed, the plate above the key is thrown upwardly, so as to move the angle lever and force its wedge or cam on the forward projection of the sliding bar on that side of the machine, and force said bar to the left, so as to carry each and all of the rear projections on said bar wholly out of the path or paths of the forwardly projecting pins of the tablet rods, so that none of the tablet rods can be held up. As the key is still further depressed, its individual tablet rod and tablet are raised until its forwardly projecting pin is carried to a point above the rearward projections of the sliding bar. The cam then passes the forward projection on the downwardly extending arm of the sliding bar, so as to release its hold thereon, when the spring moves the sliding bar to the right and brings the rearward projections into the path of the forwardly projecting pins of the tablet rods; and as the key is released and comes to its normal position, the forwardly projecting pin of the tablet rod is caught and held up by the rearward

projection on the sliding bar that lies in its path. The parts are so arranged that, as a tablet rod is thus raised, the sliding bar is first moved wholly out of the path of the pin on said rod, so that there is no engagement whatever of any kind of the tablet rod and bar or the parts rigidly connected therewith during the upward movement of said tablet rod. When another key is depressed, either in the same group or the other group, the bar is moved endwise in the same manner, and releases the tablet rod that may have been previously elevated. But this is not always done by the same mechanism. Each group of keys has its own individual wedge or cam, and therefore the sliding bar is moved to drop a tablet and to get into position to let a tablet pass for catching it, sometimes by
68 means of one individual wedge, and sometimes by means of another individual wedge, there being an individual wedge for each group of keys. There is, however, no connecting mechanism for connecting these individual wedges to the two groups of keys and the rods and tablets on the right and left hand sides of the machines, other than the sliding bar itself. When the key is released, and thus releases the angle lever, the spring at the lower end of said lever pulls said lever to its normal position, the lever rocking or tipping on its axis, so as to let its wedge or cam pass upwardly on the left-hand side of the forward projection with which it engages, and then snap laterally to the right to bring it into position for another action. In the left-hand group of keys there is a key having no number on it, and which key is not provided with any tablet rod or tablet. Said key is, however, connected through the swinging plate and angle lever with the sliding bar, so that any tablet, after being thrown up, may be dropped by depressing said key, without throwing up another tablet; so that the machine will not always keep in view the tablet of the key last operated.

(Adjourned.)

OCT. 30, 1889.

Int. 8. Compare the indicating mechanism of the defendants' machine with the indicating mechanism of the Ritty and Birch patent, stating how the same resemble or differ from each other in construction and mode of operation, and state whether you do not find in the defendants' machine, as illustrated by said exhibit, the combination of devices set out in the first claim of the Ritty and Birch patent, giving your reasons for any opinion you may express.

Ans. These machines resemble each other in the fact that the indicating mechanism is in a registering and indicating machine, but these machines differ from each other in the fact that the defendants' machine has combined one registering mechanism with a series or group of keys, instead of having a separate mechanism for each individual key of a series. They also resemble each other in the fact that the keys outside the case operate to expose a tablet in the case; and by the operation of so exposing the tablet, cause the tablet previously exposed to be dropped out of sight. They also resemble each other in the fact that each has a series of in-
69 dicating tablets operated by keys, but in the defendants' ma-

chine the one series of indicating tablets are operated by two series of keys, instead of by a series of keys, as specified in the first claim of the Ritty and Birch patent. They resemble each other in the fact that the series of indicating tablets are arranged in several rows; but they differ in the fact that the several rows of indicating tablets in the defendants' machine are combined with as many rows or series of rods, instead of being combined with a single row of rods as in the Ritty and Birch patent. They resemble in the fact that each is provided with a series of rods, and that each rod is provided with a holding shoulder and carries one of the tablets; but they differ in the fact that this series of rods are not arranged in any one row in the defendants' machine, and that the holding shoulders project laterally instead of rearwardly, and are not in one row, so that said rods are not adapted, as in the Ritty and Birch patent, to be held up by a supporting wing or any equivalent therefor, and they are adapted to be so held up in the machine of the Ritty and Birch patent.

They also differ from each other in the fact that the holding shoulder of the rods in the defendants' machine, nor any other part attached to said rod, has any contact with or action upon the rod-holding device for moving it, or for any purpose excepting to hold up the rod after it has been raised and released so as to begin its descent. In the machine of the Ritty and Birch patent, the detent or shoulder is a shouldered wedge which acts directly upon the rod-supporting device to move said device for disengaging it from the shoulder of the rod previously raised. They resemble each other in the fact that both machines have a supporting device for holding up the tablet rods and tablets, but they differ from each other in the fact that the machine of the Ritty and Birch patent has a supporting wing and the defendants' machine has a supporting bar. The term "wing" is specifically and accurately descriptive of the holding device of the Ritty and Birch patent, but it is not descriptive of and applicable to the holding device in the defendants' machine.

The term "wing," as applied to a part having a movement relatively to the part to which it is connected and from which it projects, is understood in the arts to apply to a hinged, pivoted or oscillating member in contradistinction to a sliding member.

70 In the combination of the Ritty and Birch patent, this wing is a plain, straight-edged plate of the most simple and inexpensive construction. In the defendants' machine the supporting device is not a plain, straight-edged bar, but is one containing a series of separately formed pins of unequal lengths, making it much more expensive, and necessarily giving it a different combination with the other parts and a different mode of operation, requiring to be moved in a different direction. It slides instead of oscillates, and it is not in any sense the equivalent to a wing.

Even if it were practicable to arrange the supporting wing of the Ritty and Birch patent so as to slide backward and forward instead of swing, it would still be a simple straight-edged plate, adapted to operate with the particular indicating mechanism described in the

Ritty and Birch patent, but the sliding bar of the defendants' machine cannot be substituted in the Ritty and Birch indicating mechanism for the supporting wing of that mechanism. The supporting wing of the Ritty and Birch patent cannot be substituted in the defendants' indicating mechanism for the sliding bar. Furthermore, with the defendants' indicating mechanism I cannot conceive of any way by which a plain, straight-edged plate can be substituted for the sliding holding bar in the defendants' machine, whether that bar is made to rock, or swing, or oscillate, or slide in any direction, either from front to rear or from side to side.

I notice that the first claim, instead of merely mentioning that each rod carries one of the indicating tablets, specifically refers to the series of indicating tablets as a separate and distinct element in their combination with a series of rods, supporting wing and connecting mechanism. Considered with reference to this combination, I understand it to refer to the fact that the rods are arranged in one row so as to be supported by the straight-edged wing, while the tablets are arranged in several rows; and this is the only feature wherein the tablets enter into the general combination to perform any peculiar function with reference to the series of keys and supporting wing; for it is evident that the series of keys, series of rods having detents, the supporting wing and connecting mechanism would have precisely the same mode of operation and conjoint action whether the tablets were present or not, excepting as
71 they are arranged in several rows, while the rods and supporting wing are compactly arranged in a single row.

I have already said that the defendants' machine does not have any part whatever on its rods that moves or assists in moving the holding-up device, whereas in the machine of the Ritty and Birch patent the engagement of the shouldered wedges on the rods acting upon the supporting wing to move or assist in moving said wing constitutes a part of the mechanism which connects the keys, series of rods and tablets with the supporting wing; and its function is specifically and unmistakably stated in the specification. The defendants' machine has one mechanism at one point for moving its supporting bar, and another mechanism at another point for moving said bar; but they do not act conjointly for moving the bar, although they have a common action on the bar so that when the bar is operated by either of them it will permit the tablet previously raised to drop. The defendants' machine does not have any mechanism which is common to all its keys for moving this bar. The Ritty and Birch patent has such a mechanism, but it is not the sole mechanism for moving the wing, but is designed, as stated in the specification, to aid the elbow or shouldered wedge of the different individual rods in pressing back the wing. The defendants' machine does not contain the arm J, link *p*, lever *m*, follower *j* or bell crank L, which is a part of the connecting mechanism of the Ritty and Birch patent, neither does it contain any mechanism whatever that acts by a direct push upon its supporting bar, nor a mechanism of any kind that could be used in the combination of the Ritty and

Birch patent for moving its supporting wing out from under the detent or shoulder of the tablet rods.

For these reasons I am of opinion that the Exhibit Defendants' Machine does not embody the combination of devices set out in the first claim of the Ritty and Birch patent, and that it does not embody a combination which contains either the same or equivalent means, or which operates in the same way or produces the same result, further than that it is a machine which belongs to the same general class as that upon which the machine of the Ritty and Birch patent is supposed to be an improvement.

Int. 9. In so far as the defendants' machine has points of resemblance to those portions of the machine of the Ritty and
72 Birch patent which are referred to in the first claim thereof, to what extent do the defendants' machine and the machine of the Ritty and Birch patent resemble the machines of the Pottin and Campbell patents, here in evidence, and what is the relation of the defendants' machine and the machine of the Ritty and Birch patent to the machines of the Pottin and Campbell patents, in so far as the mechanism for operating the indicating devices is concerned?

Ans. The machine of the Ritty and Birch patents and the machines of the Pottin and Campbell patents and the defendants' machine all resemble each other in their general mode of operation, whereby operating any key will disclose a tablet which will remain disclosed until the machine is operated to disclose another tablet; but the mechanisms for doing so are different in each. The supporting bar of the defendants' machine, and the manner of operating it, more closely resemble the longitudinally moving holding bar and its connections in the machine of the Pottin patent than it does anything found in the Ritty and Birch patent; so also, its series of indicating tablets and series of rods with their holding shoulders more closely resemble those of the Pottin patent than they do the indicating tablets, series of keys and rods of the Ritty and Birch patent. The defendants' machine resembles the machines of the Pottin and Campbell patents more closely than it does the machine of the Ritty and Birch patent in the fact that its holding mechanism is operated upon to move it in any one operation by only one mechanism.

The Ritty and Birch patent differs from the defendants' and the machines of the Campbell and Pottin patents in that it is the only machine that has a supporting wing, and the only machine that has two mechanisms for acting upon the holding device for moving it at any one operation. In my opinion, the defendants' machine more closely resembles the machine of the Pottin patent than it does the machine of the Campbell patent or the machine of the Ritty and Birch patent.

Cross-examination by EDWARD W. RECTOR, Esq., of counsel for complainant:

Cross-Int. 10. What do you understand to be the meaning of the term "connecting mechanism" in the first claim of the Ritty and Birch patent?

73 Ans. The side levers J J, the bar underneath the keys, the link connected to one of said levers J, the smaller lever connected to the other end of said link, the follower or trip, and the so-called bell-crank lever on which said trip is hung, the rear end of the lever which projects from each key, the lower part of the rods which rest upon said keys, and the shouldered wedges on said rods, said parts being combined in such manner that the wedge of the individual rods, and the so-called bell-crank lever, both of them aid each other in pressing back the supporting wing every time said wing is operated.

Cross-int. 11. Do you understand that all the elements referred to in your last answer are included in the term "connecting mechanism," as used in the first claim of the patent?

Ans. Yes, as described in the specification.

Cross-int. 12. What do you understand to be the meaning of the word "keys" in said claim?

Ans. A swinging finger piece outside of the case.

Cross-int. 13. Do you consider the word "keys" to refer only to that part of each of the levers E which is in front of the pivotal shaft D of said levers in the Ritty and Birch patent?

Ans. I consider such the part which performs the essential function of keys, but I am aware that the Ritty and Birch patent also describes a rearward extension, from the axis of each key, for connecting the keys with the different tablet rods.

Cross-int. 14. Then, as I understand you, the portions of the levers E, in the rear of the shaft D, do not, in your opinion, form part of the "keys" referred to in the first claim of the patent?

Ans. They are an extension of the keys, and there are no keys described in the specification without such extension.

Cross-int. 15. Are these extensions, in your opinion, included in the term "keys," as used in the first claim of the patent?

Ans. There are no keys described without them. This I consider is all that is proper for an expert to give an opinion upon, as to say definitely what any term includes, further than to describe the thing referred to as found in the specification, would be construing the claim.

Cross-int. 16. Then you decline to express an opinion as to

74 whether the term "keys," as used in the claim, refers only to those portions of the levers E, which are in front of the pivotal shaft D, or whether it refers to the entire lever E, extending both in front and in the rear of the pivotal shaft?

Ans. I do not decline to do so. I think it refers to the entire lever, both in front and in the rear of the pivot.

Cross-int. 17. What do you understand to be the meaning of the word "rods," as used in the first claim of the Ritty and Birch patent?

Ans. The vertically sliding rods shown and described in the specification for carrying the tablets.

Cross-int. 18. Do you understand it to refer to the entire rod from its lower end, which rests on the key, to its upper end, where it is joined to the tablet?

Ans. Yes, and also to the extreme upper end of the tablet, which is carried upon the rods.

Cross-int. 19. What parts do you understand to be referred to by the word "tablets," in the first claim of the patent?

Ans. The plates on the upper end of the rod, having indicating figures thereon.

Cross-int. 20. What by the words "detent or shoulder," as used in said claim?

Ans. A shouldered wedge upon the rod, the inclined side of which has a wedging action in pressing back the wing, and the shoulder or lower end of which is caught by the upper edge of the supporting wing to hold up the tablet rod and tablet.

Cross-int. 21. And in your opinion the rear ends of the levers E, the lower ends of the rods F, and the shouldered wedges or detents on the rear side of said rods, are all included within the term "connecting mechanism," as used in the first claim of the patent?

Ans. They are clearly described in the specification as a part of the connecting mechanism that operatively connects the keys with the supporting wing, and a part of the connecting mechanism which I understand as referred to in said first claim.

Cross-int. 22. What is the office or function, in the Ritty and Birch machine, of the mechanism which consists of the bar K, levers J, link p, trigger m, follower j, and the bell-crank lever L?

Ans. The only office assigned to said parts in the specification is that of aiding the shouldered wedges of the tablet rods in pressing back the supporting wing; and it presses the wing back by a direct push, instead of by a wedging device.

Cross-int. 23. What is the purpose of thus pushing back the wing I when any key is operated?

Ans. To permit another shouldered wedge to rise, and to let the shouldered wedge, previously raised, fall.

Cross-int. 24. And this mechanism operates when any key is depressed to push back the wing I a given distance against the force of the spring connected to it, and to then suddenly release the wing, and permit its spring to pull it forward under the shoulder of the elevated tablet rod?

Ans. It does not of itself, as described in the specification, although I have no doubt that it would be capable of doing so, provided the machine was reorganized so that there would be no conjoint action of this mechanism and the wedge or incline on the rod.

Cross-int. 25. Then, independently of any action of the wedge upon the rod, the mechanism referred to will operate, upon the depression of the key, to push back the wing I a given distance, and then suddenly release the wing so that the spring connected to it will snap it back to normal position?

Ans. It will, provided the rods are all removed from the machine.

(Adjourned.)

OCT. 30, 1889.

Cross-int. 26. Do you anywhere find, in the prior art, as exhibited in this case, a registering or indicating machine or analogous device, in which a tablet-supporting wing or bar of any kind was combined with a series of tablet rods and operating keys, and a mechanism of any kind interposed between the keys and supporting bar or wing for actuating the latter directly from the keys, as distinguished from movement given it through the tablet rods?

Ans. No, I do not know of any such machine in any patent exhibit in this case, including the Ritty and Birch patent. But I have in mind a prior patent, not an exhibit in this case, which clearly comes within the terms of the question. I refer to the patent to Hardy, No. 231,165, dated Aug. 17, 1880.

76 (Patent aforesaid introduced in evidence by defendants' counsel, and marked "Defendants' Exhibit Hardy Patent, J. H. M., sp'l ex'r.")

Cross-int. 27. What do you call the tablet rods in the Hardy patent?

Ans. That portion which is shown in Fig. 3 of the drawing in the middle of each tablet, at its lower edge, which performs the function of the tablet rod of carrying the detent, taken in connection with the edges of the tablets themselves, which perform the guiding function of tablet rods. This middle portion is the lower one of the parts lettered a in said figure, and the tablets are lettered K.

Cross-int. 28. What part of the Hardy device do you call the supporting bar or wing?

Ans. The pivoted, oscillating plate which is marked "J" in Figs. 1 and 4.

Cross-int. 29. What parts in the Hardy device do you call the operating keys?

Ans. The parts labelled D, D^1, D^2, D^3, D^4.

Cross-int. 30. Are the tablets in the Hardy device lifted into view by the operating keys, or by the tilting plate which you say corresponds to the supporting wing or bar?

Ans. By the operating keys acting conjointly with the tilting plate.

Cross-int. 31. Then they are not lifted directly by the keys?

Ans. No, there is an intermediate mechanism.

Cross-int. 32. In the Hardy device the keys are operated by pulling them outward horizontally, are they not?

Ans. Yes.

Cross-int. 33. When a key is thus pulled outward, is its corresponding tablet lifted up into view?

Ans. Yes.

Cross-int. 34. How?

Ans. The Hardy specification says: "One of these slides K is intended to be thrown up and held whenever the corresponding pull is drawn, and the manner of operating the slides is as follows: The tilting plate J, on which the fares fall, is pivoted in the top of the box A." Then follows a description of the connecting mechanism,

77 which, among other things, says: "The tilting plate J is intended to be tilted by each of the pulls D, D^1, D^2, D^3, D^4, independently of the others; and for this purpose the shaft of each of the pulls D, etc., is connected by a jointed connecting rod M with one end q^1 of lever r, which is pivoted between jaws s s underneath the outer edge N of the tilting plate J. * * * The end q^4 of the lever r, opposite its end q^1, which is pivoted to the connecting rod M, is pivoted to the end of a bolt O, which slides in an eye or guide t, depending from the under side of the tilting plate J, close to the edge N. By this connection of the levers r with the bolts O, when one of the pulls D, etc., is pulled out in the direction of the arrow 1, the connecting rod M, in addition to tilting the plate J, turns the lever r on its fulcrum, and thereby throws the bolt O out beyond the edge of the tilting plate J into the position it occupies in Fig. 1. When the bolt O is in this manner thrown out at the movement of the tilting of plate J, the end of said bolt O passes under the lug o of sliding plate K, corresponding to the pull D, etc., drawn out; so that when said pull is released and is forced back, and the springs L recover the tilting plate J to its horizontal position, the bolt O, bearing against one lug o, and the tilting plate catching the upper lug o as the bolt withdraws, forces the slide K up into its opening or slot J^1, and the passengers or others in the car can see, by examining the figures on the slide, so thrown up, whether the right pull was drawn to register the number of fares deposited in the box."

I think this portion of the specification an answer to the question.

Cross-int. 35. It is a fact, is it not, that when any one of the pulls in the Hardy device is pulled outward to its extreme limit, its corresponding tablet remains down and hidden from view, and is only lifted into view upon the return inward movement of the key and by the resetting of the tilting plate J?

Ans. It is.

Cross-int. 36. What parts in the Hardy device constitute the connecting mechanism between the pull keys and the tilting plate, which you say corresponds to the supporting bar or wing?

Ans. The connecting rod M, the lever r, the intermediate link, the bolt O, the lugs or bearings in which said lever and bolts are mounted on said tilting plate. I consider the essential parts of said connecting mechanism.

78 Cross-int. 37. There is an independent set of this connecting mechanism for each one of the keys in the Hardy device, is there not?

Ans. There is, excepting as parts of each individual set of mechanism are all rigidly secured to the plate J.

Cross-int. 38. And these are the mechanisms through which movement is imparted from the keys to the tablets, are they not?

Ans. They are.

Cross-int. 39. In defendants' machine, the upper slides of the forward projections on the tablet rods are bevelled, and form shouldered wedges of said projections. The under sides of the rearward projections on the sliding supporting bar are also bevelled. What do you understand to be the purpose of this construction in the defendants' machine?

Ans. The forward projections on the rods in Exhibit Defendants' Machine are in the form of shouldered wedges, but they do not form shouldered wedges in the sense that they serve the purpose of wedges. But waiving this inaccuracy of the question, I cannot see that the matter inquired about has any purpose in the operation of the machine, other than a matter of design, because these oppositely inclined sides never have any contact with each other, and I cannot see that they would contact with each other if they were not so inclined.

JAMES SHEPARD.

Attest: JOHN H. MORISON,
Special Examiner.

79 *Evidence for Complainant in Reply.*

Taken pursuant to the sixty-seventh rule of the Supreme Court of the United States, in equity, as amended, before me, James A. Renwick, examiner.

NEW YORK, *Nov.* 2, 1889.

Present: William A. McLeod, Esq., and Edward W. Rector, Esq., of counsel for complainant; Frederick P. Fish, Esq., of counsel for defendants.

Deposition of Henry B. Renwick.

Direct examination by WILLIAM A. MCLEOD, Esq., of counsel for complainant:

Int. 1. Please state your name, age, residence, and occupation.

Ans. Henry B. Renwick; I reside in the city of New York, and am seventy-two years of age, and am by profession a civil and mechanical engineer, and have been for many years past chiefly engaged in matters relating to patents, and during the last thirty-five years frequently in each year examined as expert in suits in which patents were in question.

Int. 2. Have you examined and do you understand letters patent No. 271,363, to Ritty and Birch, being the patent in suit? If so, please state what you understand to be the invention therein described and particularly referred to in the first claim thereof, giving your reasons for the opinions you express.

Ans. I have frequently examined the patent, commencing some two years ago, and believe I understand the machine therein described and the invention referred to in the first claim thereof. The object of the machine is to register the amount of the cash paid to the clerk who has it in charge, and also to indicate visually to the

customer the amount paid by him; the machine being provided with tablets bearing numerals on their faces, which tablets are alternately thrown into use by lifting them, and depressed out of
80 sight by permitting them to fall. When any one tablet has been lifted, and the amount inscribed thereon registered, it remains in view until the clerk receives a payment from the next succeeding customer, then, on pressing the key, the tablet of the first customer is depressed, and that bearing on its face the amount paid by the succeeding customer is raised. The apparatus of the first claim of the patent relates entirely to the tablets themselves and the mechanism for raising and lowering them, and has nothing to do with the registering apparatus. The whole machine is inclosed in a box, and near the bottom of the box there are arranged in a row and upon a common shaft, much like piano keys, a row of levers E, each lever being provided with a finger piece *e*.

These levers extend from outside of the front of the machine nearly to the inside of the rear thereof. A row of vertical rods, F, are arranged in proper guides, through which they can slide freely, near the rear of the machine. The feet of these rods rest upon the rear ends of the levers, one rod on each lever; consequently, when a finger piece is depressed, the rod belonging thereto is raised; and as each rod has fastened to it a tablet, the corresponding tablet is also raised. If this were the whole construction of the apparatus of the machine, the rod, with its tablet, would drop as soon as the finger of the clerk was taken from the finger piece; the rear ends of the levers E falling at their rear end, being drawn down either by gravity or by a spring or both. Now in order to hold the rods up after they have been lifted, there is applied to the machine behind the row of rods what is called in the patent the wing I. This is a piece of wood or metal in shape like an ordinary ruler, and pivoted at its lower edge on two pivots *f*, mounted in the sides of the case. This wing is a little longer than the whole series of rods, and its top edge is free to oscillate, describing a circle upon the pivots *f*. Each one of the row of rods is provided with what the patent calls a detent or shoulder or knuckle, lettered *d* in the drawing; this detent being at a slight inclination to the line of the rod at its upper side, and at an abrupt inclination, almost a right angle, at its lower side. This detent is on the side of the rod nearest the wing, and the wing I is always drawn towards the rod and the detent by means of a light spiral spring, shown in Fig. 2 of the drawing.

81 Under this construction, if one finger piece be depressed the corresponding rod will be lifted, the shoulder or detent on it will, as it rises, force the top of the wing I backward, and after the detent has passed the top of the wing the latter will be thrown forward by its spring under the abrupt lower projection of the shoulder, thus holding the rod and its tablet up, and the inner end of the key will fall and the finger piece rise as soon as the finger is removed, thus leaving the tablet exposed. When any succeeding finger piece is touched its corresponding rod will be lifted and the elbow of this corresponding rod will shove the wing rearward; and it might be supposed that it would always shove the wing far

enough rearward to release the detent of the first raised rod and permit it to drop. In order to so construct the machine as to give it any chance at all to work by this mode of operation, it would be necessary to have the edge of the wing a perfect straight edge; to have its pivots always in perfect parallelism with this edge; to have all the detents of precisely the same projection, measuring from the front sides of the tablet rods, and to have no play in the guides of these rods; and even then any wear or accumulation of dirt would stop the perfect operation of the apparatus. Moreover, it will appear that the expense of such a perfectly accurate construction would prevent the use of the machines.

In order to get rid of these difficulties the patent describes what is called in the first claim "a connecting mechanism," the purpose of this mechanism being to throw the top of the wing rearward when any one of the finger pieces is depressed so far towards the rear of the machine that the detent on any one tablet rod that is up will have ample space to fall in while a succeeding tablet rod is being lifted, thus rendering the operation of the machine certain. This connecting mechanism is best shown in Fig. 1 of the drawing. In this figure a long rod K is shown, which extends from side to side of the machine, and underlies all the keys. This rod is provided with two ears or projections J J, which are pivoted upon the shaft D, the same shaft that carries the whole bank of keys; consequently, when any one key is depressed, no matter which, the rod K will be depressed, and when the finger is taken off the key
82 the rod K will rise, being lifted by a spring shown in Fig. 2.

One of the projections J J extends upwards, as may be seen in Fig. 1, and has pivoted to its upper end a connecting rod *p*. The rear end of this connecting rod is pivoted to a lever *m*, at the lower end thereof; this lever *m* being mounted on a fixed pivot near the centre of the lever. Above this lever *m* there is mounted what the patent calls a bell-crank lever L; not technically a bell-crank lever, but a bent lever. This lever is pivoted at *h*, and it is provided with what the patent calls a follower *j*, hung upon the same pivot as the lever L. This follower, as it swings backwards and forwards on its pivot, at times swings towards the front of the machine and away from the lever, and at other times moves with the lever. It is not an absolutely necessary adjunct of the lever L, so far as I can discover, but makes the operation more perfect. The rear end of this lever L bears against the upper and front surfaces of the wing I, when this rear end has oscillated as far as it can towards the front of the machine. Now the mechanism, which includes all the apparatus I have described, commencing with the rod K below the key and ending with the lever L, is, as I understand it, the connecting mechanism of the first claim.

Its operation is as follows: Premising, for the sake of clearness, what I have stated before, that the rod K is depressed whenever any one of the whole number of keys is depressed. Now, supposing the parts to be in the position shown in Fig. 1, with one rod and its tablet lifted, and the shoulder of the lifted rod resting upon the wing, as shown at b^1, with all the other rods and their shoulders

down, as shown at *d* in the same drawing. Then, if the finger piece pertaining to any of the down rods be depressed, the depression will lift that rod and tablet, depress the rod K, throw the top of the lug or ear J towards the front of the machine, and move the connecting rod *p* towards the front of the machine, thus forcing the upper end of the lever *m* towards the rear of the machine. As this upper end of *m* bears against the follower J, it will force the lower end of that follower and the lever L, against which it bears, towards the rear end of the machine, thus moving the upper edge of the wing I backwards and from beneath the uplifted shoulder (as shown at b^1) far enough to release the shoulder and permit the up-
83 lifted rod to drop. During the time that this operation of throwing the wing back or out of engagement with the uplifted shoulder, by means of the connecting mechanism, the rod which pertains to the key being acted upon, is being lifted until its shoulder gets above the top of the wing I, so that when the wing flies forward again it will hold up this rod and tablet.

While the finger piece is being depressed the upper end of the lever *m* moves in a circle struck from its centre, and as follower *j* and lever L move in a circle struck from their common centre *h*; in consequence of this the upper end of the lever *m* and the lower edge of the follower *j* slide on one another until they get out of contact. As soon as this happens, and it happens while the finger piece is being depressed, the lever L and follower are released from *m* and fall by gravity towards the front end of the machine and away from the wing, while the upper end of lever *m* is still going towards the rear of the machine, and as the lever L moves towards the front of the machine the upper edge of the wing follows it into a position where it can hold up the tablet rod which pertains to the key being acted upon. When the finger is taken off the key the rod K is lifted by its spring. As the finger piece rises, the upper end of *m* moves towards the front of the machine; in so doing it strikes against the lower end of the follower *j* and knocks it forward until the lever slides out of contact with the follower, and then the follower drops into the position shown in the drawing, ready to be acted upon when a succeeding finger piece is depressed.

I have measured and laid out the motions of these parts, as well as my eye will permit, and find that the top of the wing I is moved to its extreme rearward position from beneath any shoulder that may be up, before the shoulder of the rod that is rising strikes it, and that the wing is moved back a little, but very little, farther than it would be moved rearward by the mere lifting of a shoulder, provided the connecting mechanism were left out; and I state that it is obvious without invention that many different ways of constructing this connecting mechanism might be employed. I wish to observe that one of the great features of the operation of this connecting mechanism is that the parts disconnect themselves during the
84 operation, or more properly at the end of the operation of throwing the wing backward, this disconnection taking place while the finger piece is still being moved downward and when the top of the lever *m* slides out of contact, as before described,

with the lower end of the follower *j*. Owing to this peculiarity of the mechanism the wing I is certain to be in place to hold the shoulder of the rod being lifted, and in another position at another time to free itself from the shoulder of a lifted rod while another rod is being lifted. I wish further to observe that a study of this description will show that one or a single connecting mechanism only is necessary, although there are many keys and many rods and detents thereon; or, in other words, a single connecting mechanism is common to all the keys and all the rods.

The first claim, as I understand it, refers to a combination of several elements: First, the series of indicating tables; second, a series of keys; third, a series of rods; fourth, a series of detents or shoulders, one for each rod; fifth, a supporting wing; and sixth, connecting mechanism; and the claim states, which statement is borne out by the drawing, that upon operating any one of the keys the wing is so moved as to permit the passage of the rod, and whereby upon the release of the key the wing engages with and holds up the tablet rod; and I understand, as usual, that this claim covers equivalents and substitutes, not only of the connecting apparatus, but of the other parts. I am aware that the patent states, page 2, line 86, that "the elbow *d* of the rod, in rising, aids in pressing back the wing I." As far as I can find out from the drawings this statement is not exactly true, because, so far as I can learn from them, the wing is pushed back by the connecting mechanism, and not by the shoulders on the rod, although it may be the case that one of the shoulders moves the wing slightly backward after the parts of the connecting mechanism are disconnected, but it only performs this duty after the preceding rod has dropped and the duty of the connecting mechanism, which is to insure the dropping of all the rods, has been performed.

Int. 3. Have you examined, and do you understand, letters patent of the United States, No. 253,506, to Campbell, and No. 231,165, to Hardy, and British letters patent No. 2076 of 1877, to Pottin, offered in evidence in this cause in behalf of the defend-
85 ants? If so, please state whether, in your opinion, said patents, or either of them, show or describe the invention referred to in the first claim of the Ritty and Birch patent, as explained by you. Please give your reasons for any opinions you may express.

Ans. I have examined all the patents named in the question, and believe that I understand them. The Campbell patent, so far as the questions here in dispute are concerned, is substantially the same as the apparatus referred to in the first claim of the plaintiff's patent (Ritty and Birch) in suit, save and except that it has no connecting mechanism. It has the keys, with the finger pieces thereto attached; also the tablets and their rods; likewise the shoulders or elbows, which are the projection d^{12}, e^{12} and f^{12}, shown in Fig. 4 of the drawing. It also has the equivalents of the wing, viz., a rod 16, in the same figure, which carries a series of hooks 15. This rod is free to slide sideways, as the wing I of the plaintiff's patent is free to oscillate, and is always, like the wing, pressed in a direction

to engage with the detent by means of a spring 18. When one tablet is lifted it is held by its detent on one of the hooks, as shown in Fig. 4; when another tablet is lifted,—say f^{10},— its detent, f^{12}, strikes its corresponding hook, shoves the sliding rod 16 sidewise, and the theory of the machine is (I doubt if it would be so in practice) that this sliding rod will be moved far enough sidewise by f^{12} to carry the hook pertaining to detent d^{12}, so that the tablet d^{10} will drop, and so that when the rod returns it will catch the detent f^{12} and hold its tablet up. It will thus be seen, as I have before said, that this is the combination of the first claim of plaintiff's patent, without the connecting mechanism.

The patent to Hardy also describes a registering mechanism which throws up and exposes to view tablets, and is supposed to permit each tablet to drop when another one is lifted. The keys in this machine slide horizontally instead of vibrating on a pivot, as in the plaintiff's patent, but this is an immaterial difference, and there is also in this machine a row of long tablets, each of which serves as tablet and rod as in the plaintiff's patent. In this machine, also, the tablets are provided each with two shoulders or projections at a slight inclination with the tablet on the upper side and abrupt inclination on the lower side, as in the plaintiff's
86 patent. One of these projections serves the same purpose as the bottom of the rods in the plaintiff's patent, because it is acted upon by a lever to lift the tablet. The machine is provided with a tilting plate J, which is intended to serve the same purpose in holding up the tablets as the wing of the plaintiff's patent, and, like the wing, this plate J is operated whenever any lever is moved, but it is not moved by one single connection which may be acted upon by any of the keys, but on the contrary there is a separate and distinct connection between each one of these keys and the tablet.

If there be forty tablets in the machine, it would be necessary to have forty connecting apparatus; and this necessity arises from the fact that the connecting apparatus forms a part of the apparatus which lifts the tablet. Moreover, in none of these connecting apparatus is there any disconnection of the parts, as in the plaintiff's machine, and the lifting of the tablet takes place after the finger has been taken away from the key. I doubt much, as I have before said, I believe, whether this machine would work practically at all, but it certainly has no connecting mechanism the parts whereof are disconnected as in the plaintiff's machine, and no connecting mechanism of any kind that can be operated upon by each and every one of the keys, or, like that of the plaintiff, common to all of the keys. In my opinion, this Hardy patent does not anticipate the first claim of the plaintiff's patent.

The English patent to Pottin has, like that of the plaintiff's patent in suit, a series of keys provided with finger pieces, and a series of rods and tablets combined, substantially as in plaintiff's patent, so that the depression of any finger key will lift its corresponding rod and tablet, and so that the finger key may return to its position while the tablet remains lifted. Each of these tablet rods is provided with a detent or shoulder like those of the plaintiff's patent in suit,

which are best shown in Fig. 2, sheet 5 of the drawings. The tablets, when lifted, are held up by a sliding rod *y* (see Figs. 5 and 6), which is substantially the same thing, and operates substantially the same way, as the series of hooks in the Campbell patent, to hold up the rods after they are lifted, the rod *y* being furnished with a series of projections which serve as hooks. These hooks enter under the elbows of the rod when the rod slides to the right, and
87 are moved from under any elbow that may be up when the rod is slid to the left by the rising of a succeeding elbow. If this were the whole contrivance, it would probably be practically inoperative like Campbell's, and like the plaintiff's, if the latter were not provided with the connecting mechanism.

In order to obviate this difficulty the sliding rod or wing *y* is provided with a series of latches *z*, one for each tablet rod. I do not deem it necessary to enter into a detailed description of the operation of these latches, it being sufficient to say that they always cause the hooks or projections on the sliding rod to move fully and clearly from under the elbow of any rod that happens to be up, so that the up rod will be sure to fall in the rising of the next one. These latches are not the same either in mode of operation or construction as the plaintiff's connecting mechanism, and do not find in this English patent to Pottin the invention described in the first claim of the patent in suit.

(Adjourned.)

NEW YORK, *Nov.* 4, 1889.

Present: Edward W. Rector, Esq., of counsel for complainant; William K. Richardson, Esq., of counsel for defendants.

Int. 4. Have you examined and do you understand the construction and mode of operation of the Exhibit Defendants' Machine? If so, please compare said machine with the Ritty and Birch patent in suit, and state whether or not, in your opinion, said machine embodies the invention referred to in the first claim of said patent, giving your reasons for the opinion you may express.

Ans. I have examined the machine referred to in the question, which evidently has had some parts removed therefrom, but still enough left to show its whole construction and mode of operation. The machine may be divided into two machines, the division being made in the centre where the registering wheels now appear, and each of these machines contains a set of keys, a set of tablets and a set of tablet rods. I will consider the machine in its normal condition, taking for that purpose the right hand of the two subdivisions. In this subdivision there is a bank of keys mounted precisely as in the plaintiff's patent in suit, and acting upon four rows of tablets and tablet rods. If there are four rows, there is cer-
88 tainly one row of tablets, and I will take that row which contains three tablets numbered 45, 25 and 5, and their three corresponding keys. It is true that these tablets are none of them bent out of the line of their rods, as some of them are in the complainant's contrivance.

But that is a matter of no importance in considering the matter of substantial identity, it being evident that the position of the tablets with reference to the rod has no bearing upon the question of how they are lifted or how they are released. I will disregard the other tablets in the machine, it being evident that if the plaintiff's invention is found in them, the fact cannot be altered by the addition of more keys and more tablets, unless such addition altered the mode of operation of the one row of tablets and their accessories. These keys, as I have before said, are mounted, like the plaintiff's upon a shaft common to all of them; each of them has a corresponding tablet rod, and the feet or lower end of the tablet rod rest upon the inner ends of the keys, which latter are provided with finger pieces, as in the plaintiff's machine. When a finger piece is depressed its corresponding tablet and tablet rod are lifted, and would fall when the finger is removed, as in plaintiff's machine, unless there was some apparatus for holding the finger up. Each rod of defendants' machine is, like the plaintiff's, provided with a detent or shoulder at a slight inclination with the rod on its upper side, and with an abrupt inclination or at right angles with the rod on its lower side; and in order to hold up these shoulders, and consequently the tablet rod, there is in the machine a long iron rod, provided on its rear side with a series of projections. The projections are bevelled on those sides thereof which are nearest the projections of the tablet rod, and are in such location toward the tablet rod that when the long rod on which they are mounted is thrown to the right by means of a coil spring, the projections on the rod will enter below the projections or elbows on the tablet rod, and will hold the tablets up if any one of them have been lifted prior to this motion of the rod containing the projections to the right.

Further, when any one tablet is lifted by its key (if what I have already described was the whole of the machine), then the elbow on the tablet rod would move the rod containing the projections to the left and out of the way during the lifting of any one tablet
89 rod. This is precisely the mode of operation of the plaintiff's machine with the connecting mechanism omitted. The long rod with projections on it in defendants' machine is not only the equivalent but also a known substitute for the wing I in the plaintiff's machine; and the fact that they are substitutes will appear by reference to the American patent of Hardy, which shows an oscillating wing, and to the English patent to Pottin, which shows a sliding rod with projections. Now, if there were no connecting mechanism in the defendants' machine there would be a liability of any rod that was up not falling when a succeeding tablet rod was lifted; the same liability that exists in the plaintiff's machine without the connecting apparatus. The shoulders on the tablet rods and the projections on the equivalent of the wing are so arranged with reference to each other in defendants' machine that when the connecting apparatus is in operation the shoulders on the rod will not strike the projections at the commencement of their lifting operation by the key; and reference to Fig. 1 of the plaintiff's patent will show that this same peculiarity exists in the Ritty

and Birch machine, it being evident that the shoulder *d* cannot strike the wing I until the shoulder has been lifted to a considerable distance, even if the wing be not moved by the connecting apparatus; and it being also evident that the wing I commences to move rearward and out of the path of the shoulder, under the operation of the connecting apparatus, as soon as the shoulder commences to rise.

In the defendants' machine—I talk now, as before, of the right-hand subdivision—a nickel-plated plate about one and three-quarters inches wide overlies all the keys. This plate is provided with lugs as in plaintiff's machine and mounted upon the same axis that the keys are mounted, and is the long rod K of plaintiff's machine, which is moved when any one of the whole bank of keys is operated; and, as in defendants' machine, this nickel plate returns to its normal position when the finger is removed from the finger piece by the operation of gravity and a light spring which may be seen at the extreme right of defendants' machine. This nickel plate is arranged behind the key pivots and above the key in defendants' machine, whereas in plaintiff's machine the rod K is below
90 the key and in front of the key pivot. The arrangement in the defendants' machine is, so far as I know, the best one, but in both cases the plate in one and the rod K in the other are common to all the keys, and are so constructed that when any one key of the whole series is operated they will be moved in one direction and will return in the reverse direction when the finger is removed. The connecting apparatus of the defendants' machine consists of this nickel-plate rod mounted and moving as described in combination with certain other parts as follows: A pin projecting from the left-hand side of the nickel plate enters a slot in a bell-crank lever, this lever being pivoted near its centre as usual and at about two inches above the nickel plate. This lever is not only free to swing upon its pivot, but also to move sidewise or to the right and left, and is provided with a spring which serves to hold its lower end always towards the left of the machine, and consequently tends to press its upper end towards the right of the machine. This bell-crank lever is also provided at its upper and inner end with a shoulder projecting from it towards the left, the construction of the whole being such that the lever moves in one direction when the nickel plate is lifted and in the other direction when the nickel plate falls.

Another projection which acts in connection with the projection on the bell-crank lever is mounted upon a pendant which is secured to and moves with the long rod whose projections hold up the tablet rod. When a finger key is pressed the projection on the bell-crank lever moves downward on the right side of the projection from the pendant; and as either one or both of the meeting sides are bevelled, this motion carries the equivalent of the wing to the left, and carries it so far to the left that any tablet which happens to be up can fall. After that has happened the shoulder on the lever passes below the projection on the pendant, sliding upon it as the top of the lever *m* in plaintiff's machine passes below the end *l* of the follower *j*. The

parts connecting mechanism of the defendants' machine are therefore, when this happens, disconnected as in the plaintiff's, and the equivalent of the wing in defendants' machine is forced back to its normal position by the spring upon it, as the wing is forced by its spring int he plaintiff's. After these two shoulders have become disconnected and the equivalent of the wing has taken its normal
91 position, thus holding up any tablet rod that may have been lifted, the shoulder on the bell crank is moved over to the left on the projection of the equivalent of the wing, and rises again when the finger is removed from the finger key as the lever *m*, and oscillates backwards in the plaintiff's machine.

This connecting mechanism of the defendants is therefore disconnected at certain times in order to let the mechanism, which holds the rods up, take its normal place under the influence of the spring, at substantially the same time and for the same purpose as that of the plaintiff's patent, and in both the connecting mechanism (when not disconnected) under the pressure of the finger of the operator moves the wing or its equivalent out of the way so as to let a rod drop before the succeeding rod has fully risen. The connecting mechanism of the defendants' machine as a whole, is therefore, first, the nickel plate; second, the pin in it which moves the bell-crank lever; third, the bell-crank lever; fourth, the shoulder on the inner end of the bell-crank lever; and fifth, the shoulder on the pendant attached to the equivalent of the wing. Now, it is obvious in the plaintiff's machine that if the lever *p* were prolonged, and had a shouldered latch on its end which engaged with the wing I, below the pivot thereof, such latch being capable of oscillating in one direction, and being prevented from oscillating in the other direction, that then the lever *m*, the lever L and the follower *j* might be dispensed with, and the apparatus would work just as it did before the change was made; and as I have intimated heretofore, many other mere mechanical changes might be made in the apparatus, under all of which it would retain the same mode of operation.

As a matter of fact I do not find in defendants' apparatus the lever L, or the follower *j*, or the lever *m*, for changing the direction of the motion; nor do I deem it necessary to find them in order to make out that the defendants have borrowed the plaintiff's invention, and have constructed a connecting apparatus, which, as an apparatus, is substantially the same in structure and mode of operation as the plaintiff's. In both machines there is, first, a series of indicating tablets; second, a series of keys; third, a series of rods; fourth, a series of detents or shoulders, one for each rod; fifth, in one case a supporting wing, and in the other its equivalent
92 or substitute; and sixth, in both, a connecting mechanism, by means of which combination, upon operating any one of the keys, the wing or its equivalent is so moved as to permit the passage of the rod, and whereby upon the release of the key the wing or its substitute engages with and holds up the tablet rod and tablet. In both cases the connecting mechanism is common to all the keys. In both cases the connecting mechanism is operated by depressing any one key of the series. In both cases the connecting

mechanism moves the wing or its substitute from under the shoulder of a lifted rod before the rising rod strikes the wing or its substitute. In both cases the connecting mechanism disconnects by one piece thereof sliding past another piece thereof; and in both cases the wing or its equivalent is returned to its normal position by a spring when the disconnection takes place. The result is the same in both machines, viz., that any rod and tablet shall be lifted when its corresponding key is depressed; and that the wing or its equivalent shall, during the depression of a key, be so far moved out of the way of the shoulders on the rod that any rod and its tablet which happens to be up may fall with certainty while the succeeding tablet is being lifted; this motion of the wing or its substitute being derived through the mechanism from the keys, and not from the rod itself. As I do not believe that the claim of the plaintiff's patent is confined to the exact pieces or parts that make up its connecting mechanism, but, on the contrary, it being the first connecting mechanism having the mode of operation and producing the result described in the patent, that the claim is limited to a connecting mechanism, having the same mode of operation described in the patent, including, of course, the disconnection of the parts thereof at one period of the operation, it is my opinion that the machine contains the invention set forth in the first claim of the plaintiff's patent in suit.

Cross-examination by WILLIAM K. RICHARDSON, Esq., of counsel for defendants:

Cross-int. 5. If I understand your testimony, you have stated that you find in the Campbell and Pottin patents every element of the first claim of the Ritty and Birch patent, except the "connecting mechanism," as you understand that phrase; is this correct?

93 Ans. Yes.

Cross-int. 6. And it is your opinion that the object of the "connecting mechanism," in your sense of that phrase, is that the rod which has been raised may be released with certainty when the succeeding rod rises?

Ans. Yes.

Cross-int. 7. Is it not the fact that this result was attained by the devices shown in the Pottin patent?

Ans. It is.

Cross-int. 8. It is your opinion then that the combination described in the first claim of the Ritty and Birch patent does not effect a new result, but shows a new mechanical device for producing an old result?

Ans. It does not effect a new result, but it describes an entirely new mechanism, operating in an entirely different way to produce an old result.

Cross-int. 9. Do you refer in your last answer to the fact that the Ritty and Birch patent shows a pivoted wing oscillating in a direction transverse to that of the row of keys, instead of having a

bar sliding lengthwise of a row of keys, as shown in the Campbell and Pottin patents?

Ans. No.

Cross-int. 10. In your opinion could the pivoted wing oscillating transversely, as above mentioned, and shown in the Ritty and Birch patent, be substituted for the sliding bar in the defendants' machine without changing in many other respects the construction of that machine?

Ans. In order to use the pivoted wing in defendants' apparatus the form of the connecting mechanism therein would have to be changed, but the mode of operation would be the same.

Cross-int. 11. Would a pivoted wing, such as is described in the Ritty and Birch patent serve to support and release the several rows of rods in the manner described?

Ans. I think it would, although I have never tried it, if the wing were provided with proper notches made in steps, one step made to correspond with each row of rods, or a plain-edged wing would do
the work provided the elbows of all the rows of rods were
94 extended into the same plane, as they might easily be made
to do by projecting the elbows of three of the rows farther rearward.

Cross-int. 12. Are you also of the opinion that the sliding bar of the defendants' machine could be substituted in the machine of the complainant's patent for the wing I without essentially changing the construction and mode of operation of that machine? If so, please point out how it could be done.

Ans. The mode of operation need not be changed at all. The readiest way of using the precise mechanism in all its precise details, which occurs to me on the instant and without reflection, in connection with a sliding bar, would be to use the whole apparatus exactly as it is shown in the drawing, and interpose a bell crank moving on a horizontal pivot in a vertical plane between the inner end of the lever L and a projection from the sliding bar substituted for the wing I. When the inner end of the lever L was moved rearward it would act upon one end of the bell crank, moving it rearward, and the other end of the bell crank would move the sliding rod sidewise; and I may add that the bell crank was contrived for precisely this purpose of changing the direction of motion when necessary.

Cross-int. 13. Could the elbows *d*, as described in said patent, cooperate with such a construction as you have described to push such sliding-rod contrivance out of the way, to allow a tablet to be fully raised and then to be held in position by such contrivance until another key and rod was operated?

Ans. I do not understand, as I have before stated, that that is the operation of the patented machine; but in the altered machine, as indicated in the last answer, the shoulders could be made to operate in that way by inclining them sidewise, as is shown in the Pottin machine, where they operate with a sliding rod as an equivalent for the wing.

Cross-int. 14. In other words, to admit of the substitution in de-

fendants' machine of a wing for a sliding bar, or in complainant's machine of a sliding bar for a wing, both the construction of the rods,—in so far at least as their projections in the one case, and their shoulders in the other, are concerned,—and the construction of the connecting mechanism, in your understanding of the phrase, must also be altered in each machine?

95 Ans. The construction of the rods would not have to be changed at all. By the words "shoulders" and "projections," in your question, I understand you to mean the same thing, viz., the shoulders inclined on their upper sides, both in complainant's patent and in defendants' machine; and the structure of these shoulders would not have to be changed in either case; they would merely have to be turned at right angles on the rod; these two different positions of the shoulders being shown in the Pottin English patent and Hardy American patent. The connecting mechanism would not have to be changed in either case. All that would be necessary would be to change the direction of its motion by a bell crank or some known mechanical equivalent therefor.

Cross-int. 15. Please examine the drawings of complainant's patent, and say whether if the elbow or shoulder *d* were removed a rod supporting the tablet would remain.

Ans. Yes, it would; but the rod and tablet would not be held up when the inner end of the lever E was dropped on the removal of the finger.

Cross-int. 16. What I mean is, if the elbow *d* were removed, would not the rod be disconnected and left in two separate pieces?

Ans. As the elbow in this case happens to be made by bending the rod instead of projecting a piece from it, both constructions amounting to the same thing, the proposition in the question is a correct one.

Cross-int. 17. The elbow *d*, then, being simply an integral part of the rod bent outward, how can you change the construction of the elbow, or its direction, if you prefer that phrase, without changing the construction of the rod?

Ans. Very easily; by turning the rod round ninety degrees, and twisting the tablet round ninety degrees; or by making the rod in the first place with its bend in the direction of the row, instead of at right angles to the row.

Cross-int. 18. Do you understand that a series of indicating tablets, supported upon a series of rods, was new at the time of the complainant's patent?

Ans. No; I have already said that they were not.

96 Cross-int. 19. And do you know that in this specification the patentees describe their keys as a series of parallel keys, and describe the tablets having their stems bent so that they can overlap each other?

Ans. I do; and I have already referred to the fact that both of these are the preferred construction of the plaintiff's machine.

Cross-int. 20. What, in your opinion, was the patentees' object in having the upper side of the shoulder *d* bevelled or inclined, as described and shown?

Ans. For the same reason that it is thus inclined in the defendants' machine, viz., to obviate danger of the breakage of the parts in case the connecting mechanism should get out of order.

Cross-int. 21. Is it your experience in the drawing of patents that their lettering and the scale of the parts are so accurate that they can safely be used to override the express statements of the specifications?

Ans. The letters are wrong sometimes in patent drawings. The proportions are sometimes wrong in the drawings; and I have known of cases where, after a study of both specification and drawings, it was evident that the specification must be corrected by the drawing, and in others where the drawings must be corrected by the specification. Of course this only follows when the error in either case is a tolerably clear one to the mind of the person who desires to ascertain correctly the meaning.

Cross-int. 22. Having in mind the fact that the mechanism set forth in the first claim of defendants' patent does not effect a new object, but is only a new mechanism for accomplishing an old result, please point out what device in defendants' machine is a colorable substitute or equivalent of the bar K in complainant's patent.

Ans. The nickel plate, as I have before termed it, in the defendants' machine.

Cross-int. 23. Have you not testified in an affidavit, in another cause between these parties, that there was a patentable difference in placing such a connecting bar over the rear arms of the key levers, instead of under the forearms?

Ans. No, I think not. I have said that it was a better arrangement; and, even if I had said that this new arrangement was patentable, it would not prevent the bar arranged behind the
97 key pivots from doing the same duty as the one before them in a connecting apparatus.

Cross-int. 24. Please state, with the same understanding of my meaning as in the last question, what is the substitute or equivalent for the flat arms J, as described on page 2, line 40, of said patent.

Ans. So far as these flat arms support the bar K in the one case, and the nickel plate in the other, the flat arms which support the nickel plate on its shaft are the equivalent of the arms J. The extension upwards of one of these flat arms J, in the plaintiff's patent, communicates motion to the other parts of the connecting mechanism, the end of this extension moving part passes with the rod K, which underlies all the keys. In the defendants' machine the horizontal rod or pin attached to the nickel plate, and moving with it and operating the bell crank, is the extension of this arm J of plaintiff.

Cross-int. 25. Please state similarly what substitute or equivalent you find for the links p.

Ans. That is merely a rod for transferring motion from one place to another. It might be dispensed with in the plaintiff's machine by a different formation of the lever m; and I see nothing that performs the same duty as that rod in the defendants' machine.

Cross-int. 26. I ask the same question with regard to the trigger *m*, the lever L and the follower *j*. Please answer as to each and all of them.

Ans. The trigger, as you call it, or small lever *m* is a lever so operating as to move the lever L, and consequently the wing I, rearward. This same duty is performed by the end of the bell-crank lever in the defendants' machine which moves the pendant from the sliding bar, and consequently the sliding bar sidewise, in order to permit the shoulders, and consequently the rods, to drop.

The lever L and follower *j* are moved rearward by operation of the lever *m* so as to permit the rods to fall. The equivalent of the lever L for this purpose, in the defendants' machine, is found on the projection mounted upon the pendant from the sliding rod which performs the same duty. The lever L, and consequently the wing, fly back into their normal position after *m* and L have
98 got out of contact. In defendants' machine the sliding bar and the protuberance on its pendant fly back to their normal position when the protuberance on the lever slides by and disengages from the one on the pendant. In plaintiff's machine the follower *j* flips over the upper end of the lever *m* on its return, so that *m* may be again in position to move L. In defendants' machine this flipping-over motion has been transferred from *m* to L, because the bell crank of the defendants flips over sidewise to get into its new position.

In the plaintiff's machine the follower *j* might be mounted upon the lever *m* instead of upon the lever L without substantial change either in mode of operation or construction. Now I find in the defendants' machine the above parts performing the same duties as *m*, L, *j*, but owing to the fact that the device which corresponds to *m* in defendants' machine has two motions, one on its axis and the other a swinging motion, I discover in it no separate and distinct piece which performs the duty of the follower *j* and at the same time performs no other duty.

Cross-int. 27. Are you of opinion that the complainant is entitled to hold as an infringement of claim 1 the combination in a cash-register with a series of tablets, keys, rods, detents and supporting wings, every connecting mechanism which effects the result described in the latter part of said claim?

Ans. No, I am not. The only connecting mechanisms which he can hold are ones which operate substantially in the same way as the one described in the patent, and, as wholes, substantial equivalents of the connecting mechanism described in the patent.

HENRY B. RENWICK.

Attest: JAMES A. RENWICK,
U. S. Examiner.

99 *Further Evidence for Defendants,*

Taken pursuant to the sixty-seventh rule of the Supreme Court of the United States, in equity, as amended, before me, Henry C. Merwin, special examiner.

BOSTON, *Dec.* 30, 1889.

Present: William A. Macleod, Esq., and Edward W. Rector, Esq., of counsel for complainant; William K Richardson, Esq., of counsel for defendants.

Deposition of James Shepard.

Direct examination by WILLIAM K. RICHARDSON, Esq., of counsel for defendants:

Int. 1. What is your name, and have you testified before in this case?

Ans. James Shepard. I have testified before in this case.

Int. 2. Have you read and are you familiar with the deposition given by Mr. H. B. Renwick on behalf of the complainant in this case?

Ans. Yes, to both branches of the question.

Int. 3. Mr. Renwick in his deposition expresses his views as to the construction and mode of operation of the machine shown in the Ritty and Birch patent here in suit. Please state whether you agree with those views, and, if not, state wherein you differ from him, and your reasons therefor.

Ans. I do not agree with him in his construction as to the parts which are called in the first claim "connecting mechanism." As before stated by me, I think this term clearly applies to all of the parts which aid or assist in pushing the wing back for accomplishing the result recited in said first claim. It is, however, immaterial whether all of these parts are included in this term, or
100 whether it includes a part of them only and the other parts be included in the other elements recited in the claim. No matter under what term said parts are included, they are a part of the combination recited in the first claim, and therefore the elements, as a whole, must co-operate substantially in the manner shown and described, whether they are referred to by one part of the claim or another.

I understand from Mr. Renwick's testimony that what he calls the connecting mechanism, that is, the parts that push the wing backwardly through the lever L, is the essential novelty of the first claim, and that all the other parts or their equivalents are substantially old in substantially the same combination.

I do not fully agree with him in this. So far as I know, the parts enumerated in the third claim are just as clearly new as are the parts recited in the first claim, and that novelty is given mainly to the first and third claims by the peculiar construction of the wing I, and the series of rods supported thereby. In fact, I think the

first claim and the specification give more prominence to the wing than to any other one element, and I think the state of the art justifies thus emphasizing the importance of the wing and pointing it out so particularly in the first claim. I understand from Mr. Renwick's testimony that what he calls the connecting mechanism is the part particularly relied on in the patent to accomplish the result which the patentee desired to obtain. I understand from the patent that the wing, I, is the principal thing to effect the desired result. The specification recites in brief and general terms the general result of the machine, or at least an important feature of it, and then says:

"To effect this result we pivot, by means of trunnions or a shaft extending between the sides B, a forwardly inclined wing, I, pivoted at its lower edge, as at *f*, and resting at its upper edge against the rear sides of the upper portions of the rods, F. This wing extends back of all of the rods, and is free to vibrate on its pivotal axis *f*. It is yieldingly held against the rods by any suitable spring, a spiral spring being shown for that purpose in Fig. 2, secured at one end of the wing and to the side B of the frame."

This wing and its relation to the rods are clearly new, as far as I know, and are certainly an important factor of the machine. It is something more than a mere supporting device for the rods,
101 and it seems to me that any machine without it could not have the combination of the first claim, even if it contained all of the other elements.

I understand the first claim of the patent to relate to that portion of the machine which throws up the tablet rods and tablets, and operates this wing to permit the passage of the rods, and to hold up the different tablet rods at different times. I do not agree with Mr. Renwick that the mechanism which acts through the bell-crank lever L alone acts to thus move the wing, without the aid of the inclines on the rods; or in other words, as I understand him to state, that "the wing is pushed back by the connecting mechanism, and not by the shoulders on the rods." Mr. Renwick, however, on page 84, adds to this statement that the wing may be moved slightly backward by one of the shoulders on the rods, after the rod previously up has been dropped. In my opinion, the combination recited in the first claim, no matter what parts are included by the term "connecting mechanism," operates to press the wing back both by the incline on the rod and the bell-crank lever L. The specification positively states that "when any key is pressed down, its rod and tablet are raised, and the elbow *d* of the rod, in rising, aids in pressing back the wing I; but to aid the elbow, the arm J on the right," etc., describing the parts to the bell crank L. This positive statement of the specification clearly shows that the elbow of the rod and the bell crank L and connected parts both aid in pushing back the wing, and it clearly implies that they do so simultaneously. I understand Mr. Renwick as modifying or ruling out from the patent this explicit statement as inconsistent with the drawings. In this I do not agree with him. The Patent Office drawings are not intended to be made with such accuracy and exactness as to

overcome a positive statement in the specification. Their office is to assist in the description of the device, and not to overcome it, unless it is clear that there was a manifest error in the specification, and no error in this specification has been pointed out, neither can I discover any, and no reason has been given for supposing the specification to be erroneous other than the drawings.

I have, however, carefully measured and laid out the parts of the drawings with great care, and I find that in the exact form in which the parts are shown in Fig. 1 there is a time in the operation
102 of the parts that one of the elbows *d* of the rods and the rear end of the angle lever L would be both simultaneously held or pressed against the wing, and they do this before the lever *m* has been disconnected by passing the follower *j* far enough to release the same; and thus, if we follow the drawings alone, and ignore the specification, one of the shoulders is acting upon the wing before what Mr. Renwick calls the connecting mechanism is disconnected. Furthermore, the shoulder on the rod after such disconnection, next by a continuation of its movement alone pushes the wing backward, until it is high enough for the upper edge of the wing to come under it. Furthermore, I find that it is utterly impossible with the combination shown in Fig. 1 of the drawings to ever operate at all to bring the tablet rod for the wing to engage with and hold up the tablet rod and tablet as recited in the first claim, excepting as said wing is pushed back by the incline of one of the elbows on the rods. In other words, it is utterly impossible for the so-called connecting mechanism, acting through the lever L, to alone push the wing back for the purposes recited in the first claim; that is, to permit one rod to pass downward and another to pass upward to the point for engaging the wing.

It is true that following Fig. 1 of the drawing, independently of the specification, the angle lever L will act through the keys to push the wing I backwardly far enough to drop the rod previously held up, before the incline of the elbow *d* comes in contact with the wing. After a time, the confronting faces of the follower *j* and the lever *m* disengage each other, but the follower *j* is not then released; on the contrary, it bears against the rounded upper end of the lever *m*, so as to hold the angle lever L stationary for a time, and let back a trifle until the elbow *d* contacts with the wing I, and just after such contact the lever *m* releases the angle lever L. After the lever *m* has released the angle lever L, the wing bears upon the wheel of the elbow *d*, so that it is ready to come into place as soon as the angle of the elbow passes the upper edge of the wing. The specification says:—

"Now, the parts are so arranged that when the lower side of the elbow *d* is just above the top edge of the wing the key has completed its downward stroke, and is arrested by the front bar, N, of
103 the case, the trigger *m* has passed beyond the nose *l* of the bell crank, so that the latter swings back out of the way, and the spring *a'* draws the wing forward under the elbow *d*, so that the latter rests upon the upper edge, as seen at *b'*, Figs. 1 and 2, and

there remains, thus retaining the tablet and rod of the operated key elevated."

From this it will be seen that the tablet rods are elevated only just high enough, and no higher, than to be caught by the wing, and that the two mechanisms which push the wing backward are both of them released when the tablet rod has been raised to the proper height for being engaged by the wing; and this part of the description is in precise conformity with Fig. 1 of the drawings.

Mr. Renwick says on page 83, "During the time that this operation of throwing the wing back or out of engagement with the uplifted shoulder, by means of the connecting mechanism, the rod which pertains to the key being acted upon is being lifted until its shoulder gets above the top of the wing I, so that when the wing flies forward again it will hold up this rod and tablet."

Now this, I understand, would be in accord with the specification of the patent, provided the term "connecting mechanism" includes the incline on the rods as well as the angle lever L, etc., but if it excludes the inclines on the rods for pushing back the wing, I do not think that the result stated could be accomplished. Perhaps Mr. Renwick did not intend to connect the last part of the sentence, that is to say, that the rod was lifted by the key to get its shoulder above the wing during the time that the wing was thrown back out of engagement with the uplifted shoulder. The specification clearly states that the shoulder and angle lever have been both released, when the rod is at proper height for being engaged with the wing, but so far as I can find, the specification does not otherwise state how the action of these two parts is timed with reference to each other. If one follows the drawings alone, the uplifted shoulder is released and the wing comes slightly forward again, and is pushed backward a second time by the elbow alone, before the shoulder gets above the top of the wing.

(Adjourned.)

104 DEC. 31, 1889.

(Witness continues:)

I understand Mr. Renwick to lay great importance upon the fact that the parts disconnect themselves for letting the wing forward. In one sense of the word this is important, because any supporting device must be able to get into position before it can act, but this is an incident common to the operating mechanism of all supporting devices, and an incident of the construction described in the patent rather than any important feature of novelty. The patent appears to lay no emphasis upon the mere fact of this disconnection, but it does take pains to particularly state the time when this disconnection shall take place, and that is, it shall surely take place at least by the time that the lower side of the elbow is just above the top edge of the wing, so that, as Mr. Renwick states, "the wing I is certain to be in place to hold the shoulder of the rod being lifted." On the whole, I am inclined to think that Mr. Renwick intended to give more emphasis to the time when this disconnection would take

place, than he does to the mere fact of disconnection itself. He says it takes place "during the operation, or more properly at the end of the operation of throwing the wing backward, this disconnection taking place while the finger piece is still being moved downward, and when the top of the lever *m* slides out of contact, as before described, with the lower end of the follower *j*." Now, in fact, this is not at the end of the operation of finally throwing the wing backward, because the further downward movement of the finger piece, which Mr. Renwick admits takes place after this disconnection, necessarily moves the wing somewhat farther back, and this final backward movement of the wing does not take place, according to the specification, until the key has just about completed its downward stroke. If the drawing alone is followed, the wing is moved backward by means of L and its connections which are disconnected to let the wing slightly forward again, and bring it into position where it is certain to be in place ready to hold the shoulder of the rod being lifted, when it receives its final backward movement by means of said shoulder and rod. From this it appears that a study of the patent will show that the wing is moved back by two different mechanisms, and therefore I do not agree with Mr. Renwick in his statement that one or a single mechanism only is necessary to push back the wing for dropping one rod, and for holding up another rod, it this is what he intends to say, as some portions of his testimony seem to imply.

It is true, as shown by the drawings alone, that what Mr. Renwick calls the connecting mechanism only is necessary to push the wing back for dropping the upheld rod, but the result recited in claim 1 of the patent includes pushing the wing back for engaging and holding up the tablet rod, and I understand Mr. Renwick to say that this may be done by one of the shoulders on the rod after the parts of the connecting mechanism are disconnected.

To recapitulate: The combination recited in the first claim and described in the patent, whether analyzed in Mr. Renwick's way or in my way, is a combination of a supporting wing and other elements in which the wing is moved backward for the upward and downward passage of the rod, and for holding up one rod by being acted upon by two different mechanisms. The specification clearly states that these two mechanisms aid each other in pushing back the wing; the drawings show that these two mechanisms both act in pushing back the wing, one acting first, the two then acting together and then one acting alone; and I understand Mr. Renwick's testimony as a whole to show that these two different mechanisms both act in pushing the wing back, their action being successive, the one acting to push the wing back for dropping a rod, and the other acting to give the final backward push to the wing for the upward passage of a rod into a position for being held up by the wing; and in my opinion, whatever the term "connecting mechanism" may refer to, the combination recited in the first claim is not present unless the parts are so combined that these two mechanisms both act to push back the wing; and further, I am of the opinion that the forwardly inclined oscillating wing resting against the rear side of all

the rods, in the manner specified in the patent, is the foundation of the entire combination referred to in said first claim.

Int. 4. Mr. Renwick states in answer to Ints. 3 and 4 and cross-int. 5, that the "connecting mechanism" mentioned in the first claim of the Ritty and Birch patent is the only element of
106 novelty in said claim in view of the Campbell, Pottin and Hardy patents. Please state whether you agree with this opinion, considering in your answer said last-mentioned patents, and also the state of the art with regard to connecting mechanism common to a series of keys at the date of the Ritty and Birch patent, and give your reasons fully.

Ans. With reference to the first branch of the question, I do not agree with Mr. Renwick that the connecting mechanism is the only element of novelty of the first claim. On the contrary, I am of the opinion that it is no element of novelty of said claim, unless the claim is construed for the specific mechanism shown and described in the patent. I will first consider the Campbell patent. I do not consider that the bar 16 and series of swinging hooks connected therewith are the full equivalent of the wing I of the Ritty and Birch patent. It is true that they constitute a supporting device for the tablets, but they are not equivalents in any other sense. They are not equivalents when considered with reference to simplicity and cheapness of construction, or with reference to ease and convenience of operation, or with reference to compactness of form of the machine, or with reference to simultaneously pressing upon all of the tablet rods; and these functions, in my opinion, are the chief advantages of the wing in the Ritty and Birch patent. I do not agree with Mr. Renwick that this Campbell patent has no connecting mechanism, for the parts are certainly so connected as to perform the same general result recited in the first claim of the Ritty and Birch patent, with the exception that it does not employ or contain the particular wing referred to in said claim. This Campbell patent not only has a connecting mechanism for so connecting all the keys, supporting device and tablets, that upon operating any one of the keys the supporting device is moved to permit the passage of the rod, and that upon the release of the key the supporting device engages with and holds up the tablet rod and tablet, but this connecting mechanism is common to all of the keys. In other words, if a broad construction is given to said claim, so as to make the wing merely a supporting device, and to make the term "connecting mechanism" include any and every mechanism common to all the keys for effecting the general result, under such a construction this Campbell patent has every element of the first claim of the Ritty and Birch patent.
107 I understand Mr. Renwick to consider the bar 16 and a series of connecting swinging hooks the equivalent of the single device or mechanism which is termed in the claim of the Ritty and Birch patent "a supporting wing."

Now, these parts in the Campbell patent have a double function. They are the supporting device for the tablets, and they are, also, the connecting mechanism which operatively connects the different keys and tablets, so that upon raising any particular tablet, the

tablet previously held up is dropped, thereby making this one single connecting mechanism common to all of the keys, so that the same result is attained by the same connecting mechanism, no matter which one of the keys in the series is operated. Of course I do not mean to say that it has the connecting mechanism of the Ritty and Birch patent, but it does have a connecting mechanism common to all the keys and producing the same general result. In this Campbell patent, the several arms of the tablet rods, which are lettered d^{12}, e^{12}, and f^{12}, have at their extreme left-hand end, as shown in Fig. 4 of the drawing, a forwardly projecting detent or shoulder, and this detent is the only part that engages with the swinging hook 15. Whenever a tablet rod is raised this detent or shoulder strikes the bevelled nose of the swinging hook immediately above it, and pushes said hook to one side until the detent rises above the shoulder on the hook. There being some play in the parts, the tablet rod previously held up would not probably be dropped, if this were the entire operation, but at the point when the detent is above the shoulder of the hook, the key is not wholly depressed, and the tablet, being lifted, has not reached the upper end of its movement. The forwardly projecting detent then engages the under edge of the swinging hook at a point just above the shoulder of said hook, and as said hooks are in the form of an angle lever, and the bearing point of the detent is to one side of the axis of the hook, the further upward pressure of the detent pushes the hooks farther to the left (referring to Fig. 4) than is necessary to engage the shoulder thereon, and consequently pushes the bar 16 and all of the hooks far enough to the left so as to positively insure the disengagement of such tablet rod or rods as may have been at that time held up by the said supporting and connecting mech-
108 anism. I have carefully measured and laid out the parts, and I am confident that the device will operate in the manner which I have described. Although this patent has a supporting device and a connecting mechanism, it seems to me that the supporting device differs from the wing of the Ritty and Birch patent to as great an extent or degree as does its connecting mechanism, and therefore I do not think that the distinction between these two devices resides wholly in the connecting mechanism, and certainly the distinction that the Campbell patent has no connecting mechanism seems to me to be clearly erroneous.

Turning now to the Hardy patent, while it has in its general result some analogy to the Ritty and Birch patent, it is obviously a very different machine, having a different mode of operation. In one sense it is hardly to be compared with the Ritty and Birch patent, because it does not have an oscillating wing which is continually pressed against all of the tablet rods, and which merely swings back out of the way while the tablet rods move upwardly, and then come back into place to hold up the rod, and therefore, in my opinion, it does not have the combination of tablet rods and wing of the Ritty and Birch patent nor any equivalent therefor, excepting in a very vague, general and indefinite sense. It has a wing or tilting plate which serves to support the tablets, but this

wing or plate, instead of being moved by the tablet rods themselves, moves the tablet rod by catching under them and carrying them upwardly, and it drops said rods by its return movement, moving out from under them. It is unlike the Ritty and Birch patent in the fact that there are as many connecting mechanisms as there are keys, and in the further fact that this wing or swinging plate is moved in one direction by the connecting mechanism alone instead of by a connecting mechanism other than the detents on the tablet rods, and also by means of said detents, as is done in the Ritty and Birch patent.

I do not agree with Mr. Renwick in that the longitudinally moving bar or long rod is an equivalent either known or otherwise for the wing I of the plaintiff's machine, further than that — is a supporting device for a series of rods, but it does not support the rods in the same way nor by the same means, and it is not an
109 equivalent for the wing I of the Ritty and Birch patent for any purpose that is peculiar to the operation of that wing. It is not its equivalent for the purpose of simplicity and cheapness in construction, or of bringing a series of tablets and tablet rods into a compact form or of moving in the same direction with reference to the series — rods.

I understand Mr. Renwick to emphasize the fact that in accordance with his understanding of the Ritty and Birch patent there is one connecting mechanism common to all the keys, and one only. As I understand the term "connecting mechanism," as used in the first claim of that patent, there is one set of operating devices for moving the wing which is common to all of the keys, and in addition thereto there are as many other connecting devices for moving the wing as there are keys. I also understand from Mr. Renwick's testimony that there are connecting mechanisms of some kind in the Hardy and Pottin patents, but that they are not common to all of the keys. I do not quite agree with this as to the Pottin patent, because one of the weighted latches on the supporting bar is only a part and not the whole of the connecting mechanism. The connecting mechanism of the Pottin patent consists, in addition to the keys, rods and inclines, of the entire series of latches and so much of the bar on which they are pivoted as connects them with each other. While it is true that each incline acts directly only upon its individual latch, it is also true that in so doing it moves every one of the series of latches and the bar to which they are connected, so that it is impossible to operate any one key in a series without moving all of the latches in the connecting mechanism, and it is also impossible to have the rod which is pushed upward act upon one of these latches without having whichever rod has been previously held up act upon another one of these latches; and therefore this connecting mechanism of the Pottin patent is common to every one of the keys in its series.

Furthermore, I understand Mr. Renwick to emphasize the fact that what he calls the connecting mechanism of the Ritty and Birch patent operates to drop the tablet rod previously held up before the succeeding rod is fully elevated, and that this connecting mechan-

ism is disconnected from the supporting device in time to have the supporting device ready to come under the shoulder of the
110 rod being lifted, and hold it up as soon as said shoulder has risen to the full height of that part of the holding device that takes under said shoulder.

Now, both of these features of construction are clearly found in the Pottin patent. The rod which was previously held up is dropped in this machine of the Pottin patent a long time before the succeeding rod has reached its proper height, and the supporting rod, after this disconnection, is ready to snap into engagement with the uprising shoulder just as quick as said shoulder rises into the same plane at the top of the projection on the bar which comes under the shoulder to hold it up, so that there is no novelty in the Ritty and Birch patent by reason of these two last-named features.

Referring now to the state of the art wherein there is a connecting mechanism common to a series of keys for moving some other part, I would say that the same is found in nearly, if not quite, every typewriter that has a series of keys. Examples of such typewriters may be found in the patents to Sholes and Glidden, and to Deming, the former being No. 200,351, dated Feb. 12, 1878, and the latter 176,518, dated April 25, 1876. Both of these show a bar extending under all of the key levers, which has connecting links extending upwardly to a rock-shaft or angle lever for operating the feed, so that said connecting mechanism is operated to work the feed whenever any one of the keys is operated. The patent to Allen shows another typewriter having such mechanism, said patent being numbered 185,714, and dated Dec. 26, 1876. In this, instead of having the bar extend under all of the key levers back of their fulcrum, there is a rocking bar C^1, Figs. 2 and 3, on the top of the key levers back of the fulcrum, and which is common to all of the keys and operated by any one of them.

Another example of connecting mechanism common to a series of keys is shown in the patent to Capron, No. 110,547, Dec. 27, 1870, for an annunciator, which shows a series of bell-crank levers, connected by wires to different pawls or keys, and having a bar resting against the back edge of said angle or bell-crank levers, said bar being secured to arms whose axis is the same as the levers, so that the bar is operated whenever any one of the levers is moved by its pawl or key. These bars have connecting rods which extend
111 to another lever, that is, the lever *i* in Fig. 1, the end of which lever bears upon a trip or follower on the tail of a bell hammer, so that when any key is operated the lever *i* is moved and presses against the nose of the follower *l*, until by both moving in the arc of a circle they slip by each other, the same as the lever *m* slips by the nose of the follower *l* in the Ritty and Birch patent, thereby making the same disconnection of the parts, and the follower *l* in like manner swinging back out of the way to let the parts again come in position for further action.

A similar connecting mechanism and a series of keys is shown in the patent to Plumb, No. 256,591, April 18, 1882, for an adding machine which registers and indicates the amount added, and there-

fore is a registering and indicating machine. It has in combination a series of tablets or numbers arranged on the periphery of the wheel C, and adapted to be exposed before a window or opening in the case, as shown in Fig. 1, and these tablets are operated by a series of keys. This wheel tablet is mounted on a shaft in common with the ratchet wheel H, the edge of which has as many detents or shoulders as there are tablets on the tablet wheel, and therefore, in a broad and general sense, these two connected wheels may be said to be the equivalent of a series of rods, each provided with a detent or shoulder and carrying one of the aforesaid tablets.

On the bottom of the case and under the wheel H is a vibrating spring that is pushed back by the detents or the teeth of the wheel, and then comes under the shoulder of each detent to prevent the wheel from moving backward, thus serving to hold the tablets in place, in a broad sense performing the office of the wing I of the Ritty and Birch patent. In connection with these keys and other parts there is a connecting and operating mechanism which is common to all of the keys. That mechanism consists of the bar M which rests upon the upper side of all the key levers at the rear of their fulcrum, and which is pivoted to the same shaft as the keys by means of the arms L L, Fig. 2. This bar carries a spring N, which engages the teeth of the wheel H. Now, whenever any one of the keys is operated, this connecting mechanism pushes the wheel H forward, and in doing so, the spring P, which may broadly be the equivalent of the wing, is moved backward to permit
112 one or more detents to pass by it, whereby, upon the release of the key, this spring or wing engages with the shoulder of the detent so as to hold another tablet in front of the window, where it is exposed to view, the one previously there exposed having been carried out of sight by the operation of bringing the last tablet into view; the operation in the general sense being the same as that of the machine of the Ritty and Birch patent as referred to in the first claim thereof.

I do not, however, consider the machine the same, but this patent clearly shows that a single connecting mechanism common to all the keys in a machine analogous to that of the Ritty and Birch patent is not new, and therefore the novelty of the first claim resides more in the general arrangement and detailed construction of the parts than it does in the broad combination of certain mechanisms or in making a connecting mechanism common to all of the keys in a combination of such mechanisms.

This same common connecting mechanism is also shown in Forrester's patent, No. 249,606, Nov. 15, 1881, for an adding machine. This shows a series of keys in the form of levers, a rock-shaft D at the rear of said levers, said shaft having a series of forwardly projecting arms to be engaged by the rear end of the key levers, so that said rock-shaft is oscillated or moved whenever any key is operated. This rock-shaft also carries a rocking arm F, which by connecting rod G is secured to the rocking arm I of the rock-shaft J, which carries a segment gear K for operating the escapement of a clock train or measuring train, thereby forming an operating and

connecting mechanism that is common to and operated by each and every one of the keys in the series.

The patent to Borland and Hoffman, No. 205,993, July 16, 1878, for an adding machine, shows and describes a machine which in a broad and generic sense closely resembles that of the Ritty and Birch patent. It is a registering and indicating machine, and has a series of tablets and devices for indicating the different amounts, and these are operated by a series of keys, and, as in the Ritty and Birch patent, by two sets of operating mechanisms, one of which is common to all of the keys, and the other of which is operated through each individual key and through a series of levers and lifting rods; but the detailed construction is wholly unlike
113 that of the Ritty and Birch patent. The keys are all combined with a rock-shaft N, so as to vibrate said shaft every time the key is operated. Upon this shaft is a rocking arm M to which is attached the connecting rod L, for operating the pawl-carrying angle lever J J, and for moving the index to indicate different tablets. This connecting mechanism is common to all the keys, and it would alone operate to indicate different tablets; but if this were all of the mechanism, the indicating pointer would move the same distance whenever any key was operated; therefore, to indicate different amounts, there is a separate connecting mechanism for each key, which separate mechanism consists of lever R and the vertically moving rod S at its rear end. These throw up the proper rod, so as to engage the bevel nose of the plate V, which is a part of the pawl on the arm J, and thereby disconnect said pawl from the detents of the indicator wheel whenever the pointer has moved a distance equal to that indicated by the key which is holding up a rod.

The patent to Howie, No. 185,537, Dec. 19, 1876, for a recording machine, shows another example of the common connecting mechanism and series of keys, there being a rock-shaft by the side of the series of keys, provided with arms that extend under a shoulder or collar on the stem of the key, thereby enabling said shaft to be rocked whenever any key is operated. Said rock-shaft has a rearwardly projecting arm, which carries a latch or trip for operating a bell hammer, the latch enabling the parts to disconnect and then come into position for acting again, all substantially as the lever *m* of the Ritty and Birch patent, and the parts against which it acts connect and disconnect from each other.

The patent to Windmüller and Ahrens, No. 217,663, dated July 15, 1879, for a register and indicator, also shows connecting mechanism common to a series of keys for ringing a bell whenever any key is operated, the parts being provided in like manner to the last-mentioned patent with a similar trip or follower for restoring the parts after each disconnection, as in the Ritty and Birch patent.

The Campbell and Pottin patents show that, broadly considered, all of the elements named in the first claim of Ritty and Birch are old in combination, or in other words, considering the "wing"
114 as a supporting device and the "connecting mechanism" to be connecting mechanism of any and every kind, these pat-

ents have all of the elements enumerated in said claim. With the same liberality as to the rods, detents and indicators, the patents to Plumb and to Borland and Hoffman show the combination of the first claim with a connecting mechanism which is common to all the keys; and in my view of the case such a connecting mechanism is certainly in one sense shown in the Campbell and Pottin patents. For these reasons I am of opinion that the novelty of the first claim resides in the peculiar mode of operation described in the patent, and particularly in the arrangement and mode of operation of the supporting wing and all of the parts that act to move it, and that the novelty of the claim cannot reside in the difference between the employment of one kind of connecting mechanism instead of another kind of connecting mechanism, unless the claim is construed for the particular details of construction in said connecting mechanism, and not broadly so as to cover a certain class or kind of connecting mechanism, in contradistinction to another class or kind for accomplishing the same general result.

I am also of the opinion that even if a certain class or kind of mechanism had never before been known in an analogous combination (which, however, is not the fact, as I have already shown), there could be no possible room for invention or anything more than mechanical skill in the substitution of one known class or kind of connecting mechanism for another known class or kind of connecting mechanism, especially in view of the fact that connecting mechanisms common to a series of keys were well known in other combinations, as shown by the patents I have referred to, and that the said connecting mechanisms were provided with a follower or trip for restoring their parts to their normal position after each disconnection.

(Adjourned.)

JAN. 1, 1890.

(The following patents are introduced in evidence by counsel for defendants, and are marked as follows:—

Patent to P. Deming, No. 176,518, dated April 25, 1876, marked "Defendants' Exhibit Deming Patent, H. C. M., sp'l ex'r."

115 Patent to Sholes and Glidden, No. 200,351, dated Feb. 12, 1878, marked "Defendants' Exhibit Sholes and Glidden Patent, H. C. M., sp'l ex'r."

Patent to R. P. T. Allen, No. 185,714, dated Dec. 26, 1876, marked "Defendants' Exhibit Allen Patent, H. C. M., sp'l ex'r."

Patent to J. Capron, No. 110,547, dated Sept. 27, 1870, marked "Defendants' Exhibit Capron Patent, H. C. M., sp'l ex'r."

Patent to F. Plumb, No. 256,591, dated April 18, 1882, marked "Defendants' Exhibit Plumb Patent, H. C. M., sp'l ex'r."

Patent to P. C. Forrester, No. 249,606, dated Nov. 15, 1881, marked "Defendants' Exhibit Forrester Patent, H. C. M., sp'l ex'r."

Patent to W. P. Borland and H. Hoffman, No. 205,993, dated July 16, 1878, marked "Defendants' Exhibit Borland and Hoffman Patent, H. C. M., sp'l ex'r."

Patent to M. Howie, No. 185,537, dated Sept. 19, 1876, marked "Defendants' Exhibit Howie Patent, H. C. M., sp'l ex'r."

Patent to J. Windmüller and F. Ahrens, No. 217,663, dated July 15, 1879, marked "Defendants' Exhibit Windmüller and Ahrens Patent, H. C. M., sp'l ex'r.")

Int. 5. Mr. Renwick, in answer to Int. 4, expresses the opinion that "the defendants have borrowed the plaintiff's invention," and that "the machine contains the invention set forth in the first claim of the plaintiff's patent in suit," basing this opinion upon the connecting mechanism used by the defendants. Please state whether you agree with Mr. Renwick, and give your reasons fully.

Ans. I do not, for the reasons which I have given in my last two preceding answers, and for many other reasons.

The mechanism that operates the sliding bar in defendants' machine is not disconnected at the time when the shoulder on the rods has risen into the same plane as the face of the holding projections on the bar, and therefore the defendants' machine does not have that peculiarity of the connecting mechanism which Mr. Renwick has particularly pointed out, whereby the supporting device is certain to be in place to hold the shoulder of the rod being lifted as soon as said shoulder is sufficiently elevated for such engagement.

On the contrary, the operating mechanism of the sliding bar
116 is not released until the shoulder on the rod has been raised to a considerable height above its seat on the supporting bar, so that the rod has to drop quite a distance after being raised before it rests upon the supporting bar. Furthermore, the defendants have not borrowed that feature of the Ritty and Birch patent by which the supporting device presses against all of the rods, or in which the supporting device ever has any contact whatever with the inclines adjacent to the shoulders of the tablet rods. Neither have they borrowed that feature of the plaintiff's patent whereby the body of the tablet rods immediately underneath its shoulder serves as a stop to limit the motion of the supporting device. On the contrary, in the defendants' machine the body of the rod under no circumstances ever has any contact with the supporting bar, and the supporting bar is limited in its movement in one direction by the frame of the machine, and not by the tablet rods.

Furthermore, the defendants' machine borrows from the Pottin patent rather than from the Ritty and Birch patent, in the fact that it employs different inclines for operating the sliding bar at different times; that is to say, as the Pottin patent moves the supporting bar by means of an individual incline or wedge for each particular key, the defendants' machine in like manner has its own individual incline or wedge for each particular bank of keys. While it is true that by severing the supporting bar so as to disconnect the two banks of keys and tablets the machine may be divided into two machines, the fact is that it is not so divided, and that it contains only one indicating machine.

The defendants' machine does not borrow any of the peculiarities or features of the supporting device of the Ritty and Birch patent

in any of those particulars in which that supporting device differs from that of the Pottin patent. The defendants' machine does not borrow the features of the Ritty and Birch patent whereby the final movement of the supporting device for the upward passage of the rod is derived through the rod itself, and not through a mechanism common to all the keys.

In fact, the defendants' machine is nothing but the combination of the series of indicating tablets, series of keys, series of rods, series of detents or shoulders, one for each rod, a supporting bar,
117 and connecting mechanism of the Pottin patent, with one known form of connecting mechanism substituted for the specific form of connecting mechanism of said Pottin patent, which substitution of connecting mechanisms does not change the general result or mode of operation of said combination, the one not being readily distinguished from the other when inclosed within a case. In other words, the particular connecting mechanism of the Pottin patent has been omitted, and the supporting bar is operated by an angle lever, by means of the bar common to all of the keys in the well-known manner of operating such angle levers, or other parts, by mechanism common to all of the keys, as shown by the various patents on typewriters, adding machines, recording and cash-registering machines, which I referred to in my last answer, and many more which I might have referred to.

While the Campbell and Pottin patents show a connecting mechanism which in one sense is common to all of the keys, in another sense it is not. That is to say, the common connecting mechanism of these patents is moved by the detents on the tablet rods instead of a mechanism acting through the keys without the aid of said tablet rods. In the latter sense, such connecting mechanism, common to a series of keys, is found in the prior patents which I mentioned in my last answer.

It is in no sense borrowing from the Ritty and Birch patent to substitute in the Pottin or Campbell machines one known form of connecting mechanism for the other known form of connecting mechanism shown in said patents, and this is all that is found in the defendants' machine. This prior art gives one, in my opinion, a perfect right to make this machine, so far as its indicating mechanism is concerned, the same being fully disclosed in the prior art and being public property, so that it is not within the province of any inventor to cover the same, and unless he did something more than to make such substitution, he could not possibly have made an invention.

I am aware that the case would be different with a pioneer inventor who was the first one to employ connecting mechanism of any kind in such a combination of parts, but the same elements in combination with a connecting mechanism, and effecting the
118 same general result, being old, there is no field for the exercise of invention in the substitution of one known kind of connecting mechanism in that combination for another known kind.

For these reasons I am of the opinion that no one can borrow

any invention from the Ritty and Birch patent, as referred to in the first claim thereof, without the employment of the peculiar arrangement and construction of the forwardly inclined oscillating wing, and the two different mechanisms for pressing it backwardly, substantially as shown and described therein.

Cross-examination by WILLIAM A. MACLEOD, Esq., of counsel for complainant:

Cross-int. 6. Do you know of any cash-register prior to the date of the Ritty and Birch patent which shows or embodies the following elements: A series of indicating tablets, a series of keys and key levers, one for each tablet, a series of tablet-supporting rods, a series of detents or shoulders, one for each rod, a movable supporting wing, and a connecting mechanism between the keys and wing, the whole being so arranged that when a key is depressed the corresponding tablet rod is raised and its shoulder engaged by the supporting wing, and the wing is moved by the connecting mechanism prior to said engagement with the shoulder, far enough to disengage and release the shoulder of any tablet rod that may be resting upon it before such movement takes place?

Ans. In view of the word "wing" and the reference in the last part of the question to releasing the shoulder of the tablet rod previously resting on said wing, I do not find any prior combination which comes literally within the terms of the question.

Cross-int. 7. Assuming that the term "wing" in the last question means any movable device that engages the shoulder of the tablet rod, when raised by a key, and is moved by the connecting mechanism far enough to disengage the shoulder of any tablet rod previously supported by it, before engaging the one raised by the key, will you please state whether you know of any prior apparatus that shows or embodies the elements referred to in the last question, operating as there stated?

Ans. Under such an assumption, the English patent to
119 Pottin comes fairly within the terms of the question, and with the single exception of the time for disengaging the shoulder of the tablet rod before held up, the Campbell and Hardy patents come within the terms of the question.

Cross-int. 8. As I understand your testimony, you consider that the wing of the Ritty and Birch patent in suit affords the chief elements of novelty in the combination which we have had under consideration; is that so?

Ans. When considered with reference to its relation to the other parts, yes.

Cross-int. 9. If you were shown a cash register or indicator in which a pivoted wing was provided, adapted to move toward and from the tablet rods or parts which were to be supported, and which was constructed prior to the date of the Ritty and Birch device, how, if at all, would it alter your opinion?

Ans. I cannot tell until I have seen it or had a further description of it.

Cross-int. 10. In the Campbell patent, which you have referred to in your testimony in this case, is there any connecting mechanism between the keys and the device that supports the tablet when raised by the keys, other than the tablet rods themselves?

Ans. That depends upon what is considered the device that supports the tablet rods. In fact, there is no device which of itself supports the tablet rods without performing other functions, except the bevelled and shouldered lower end of each hook. If these are considered the device that supports the tablet rods, there is no connecting mechanism between them and the key levers other than the tablet rods themselves. The upper part of the hooks, however, and the bar which connects the several hooks is a connecting mechanism, and the upper portion of each hook has the double office of supporting the tablet rods and serving as a connecting mechanism; and if the hooks as a whole are considered as the device which supports the tablet rods, then there is a connecting mechanism between them, or at least one end of them and the keys other than the tablet rods themselves, and that is the connecting bar, in addition to which bar a portion of the hooks themselves forms a connecting mechanism which enables said hooks to be pressed to
120 one side farther than they could be by the action of the detent on the bevelled portion only of the holding shoulder.

Cross-int. 11. Will you please answer the same question, referring to the Pottin patent?

Ans. The answer is, yes; and that connecting mechanism is the series of latches on the supporting device which have no office or function in any way whatever in holding up the tablet rods.

JAMES SHEPARD.

Attest: H. C. MERWIN,
Special Examiner.

Further Evidence for Complainant.

Taken pursuant to the sixty-seventh rule of the Supreme Court of the United States, in equity, as amended, before me, William M. Hill, special examiner.

CHICAGO, ILL., *March* 14, 1890.

Present: Edward W. Rector, Esq., and Lysander Hill, Esq., of counsel for complainant; William K. Richardson, Esq., of counsel for defendants.

Deposition of Frank J. Patterson.

Direct examination by EDWARD W. RECTOR, Esq., of counsel for complainant:

Int. 1. Please state your name, age, residence, and occupation.

Ans. Frank J. Patterson; age, forty; residence, Dayton, Ohio; occupation, manufacturer, vice-president and superintendent of The National Cash Register Company, the complainant in this suit.

Int. 2. How long have you been connected with the complainant company as vice-president of it and otherwise?

Ans. I have been connected with said company since 1883, and vice-president of it since November, 1884.

121 Int. 3. What opportunities, if any, have you had during that time for familiarizing yourself with the construction and mode of operation of the machines built by your company?

Ans. As superintendent of the manufacturing department of our company, I have had entire charge of constructing and perfecting the machines made by our company, and I have directly superintended their construction in our shops since the time I became vice-president of the company in 1884.

Int. 4. Has your company manufactured cash registers and indicators under and in accordance with the Ritty and Birch patent here in suit; if so, how long has it been making such machines?

Ans. Yes, they have made such machines since 1882.

Int. 5. To what extent has your company made and sold machines embodying the Ritty and Birch invention?

Ans. It has made and sold, and there are now in use, some 15,000 or 16,000 of such machines. These machines have been sold and put in use not only in this country, but also largely in Canada, England and Australia, and some in Belgium and France.

Int. 6. Please state whether or not you are familiar, in a general way, with all cash registers and indicators of that class to which the Ritty and Birch machine belongs, which have been put upon the market in this country up to the present time. By "class to which the Ritty and Birch machine belongs," I mean machines designed for the same purpose as the Ritty and Birch machine, and employing essentially a series of keys of different values, and a series of indicators, representing corresponding values operated by said keys, together with a registering or recording mechanism on which the values of the operated keys are registered.

Ans. In my capacity as superintendent of our company, it is my duty to become familiar with all machines of this class, which I have done, and have made detailed reports of the same to the president. I may, therefore, say that I am generally familiar with the construction and mode of operation of the various machines of this class which have been introduced into this country.

Int. 7. Please state whether or not there were any successful or practical machines of this class in use or on the market in
122 this country at the time your company began manufacturing the Ritty and Birch machine.

(Objected to as immaterial and irrelevant and as improper in reply.)

Ans. There were not. It was an entirely new industry, and the larger part of the labor and expense of our company for a number of years was directed toward advertising the machines and creating a demand for them. When we attempted to introduce the machine, we encountered a strong prejudice against them on the part of those who were required to use them, as they considered it a reflection

upon their honesty. We had great difficulty in overcoming this prejudice, and selling our machines at all.

Int. 8. The defendants in this case have introduced in evidence an English patent, granted to one Henry Pottin, of Paris, France, in 1876. Please state whether or not you are acquainted with said Pottin.

Ans. Yes; I met him in Paris in May, 1889, and became well acquainted with him, and had a number of consultations with him relating to his cash-registering inventions.

Int. 9. Do you know whether his patented machine has ever been put into practical use in England or France, or elsewhere?

(Objected to as immaterial and irrelevant.)

Ans. So far as England and France are concerned I am personally familiar with the cash registers and indicators in use there; and there are no Pottin machines among them. As to other countries, I have no personal knowledge, save the fact that Mr. Pottin himself told me there had been only one of his machines built, and that was a model.

(All of said answer after "as to other countries" also objected to as hearsay.)

Int. 10. Are cash registers and indicators of the Ritty and Birch class used to any considerable extent in England?

Ans. We have sold large numbers of our Ritty and Birch machines there, but there are very few other machines of this class in use in England.

Int. 11. Are you acquainted with Michael Campbell, of Boston, Mass., whose patent defendants have put in evidence in this case?

123 Ans. I am.

Int. 12. Is your company interested in the Campbell patent?

Ans. Yes, we have an exclusive license under it.

Int. 13. What parts of the Campbell invention does your company use?

Ans. The cash-drawer mechanism.

Int. 14. Has it ever used the indicating mechanism of the Campbell patent?

(Objected to as irrelevant and immaterial.)

Ans. No, they have not,

Int. 15. Do you know whether any machines employing the indicating mechanism of that patent are in practical use in this country?

(Same objection.)

Ans. There are none.

Int. 16. Are you, from your experience in the manufacture of cash registers and indicators, and your familiarity with their operation and requirements, able to say whether the indicating mechan-

ism of the Campbell patent could be practically or successfully used in such machines? Give your reasons for the opinion you express.

Ans. In my opinion it could not, for the reason that, owing to the connections between the operating keys and indicating tablets, by means of strings and pulleys and other devices, a proper adjustment of the parts could not be maintained in practical use of the machine, and it would very soon become inoperative; and for the further reason that, owing to the construction and arrangement of his devices for holding the tablets in exposed position, and his lack of means for releasing them with certainty, there is no assurance that an elevated tablet will be released and dropped out of sight when another is lifted into view by the operation of a second key.

Int. 17. Have all machines manufactured by your company under the Ritty and Birch patent employed a connecting mechanism between the keys and tablet-supporting bar or wing for moving the latter independently of, or in addition to, any movement given it by the shoulders on tablet rods?

(Objected to as leading, and as irrelevant and immaterial.)

Ans. Yes, they have.

121 Int. 18. Has your company ever employed such connecting mechanism in any other than the specific form of it shown in the Ritty and Birch patent?

(Same objection.)

Ans. Yes, in quite a number of different forms.

Int. 19. Have these various forms of connecting mechanisms all operated in substantially the same manner as that shown and described in the Ritty and Birch patent; that is, have they all acted, upon the operation of a key, to push the supporting wing back from under the shoulder on the elevated tablet rod, and to move the wing farther backward than it could be moved by the shoulder on the rising rod of the operated key, and to then become tripped or disconnected, to permit the wing to move forward again under the shoulder of the tablet rod just lifted?

(Same objection.)

Ans. Yes, they have all operated in that manner.

Int. 20. Has your company obtained any patents, since the date of the Ritty and Birch patent, which illustrate the specific forms of these various connecting mechanisms?

(Same objection.)

Ans. Yes, we have; quite a number. I have here copies of some of them.

(Complainant's counsel offers in evidence, and has identified by the examiner, the copies of patents referred to by witness, as follows:—

No. 318,485, to Maltby, May 26, 1885.
" 321,988, " Maltby, July 14, 1885.
" 351,460, " Patterson *et al.*, Oct. 26, 1886.
" 382,552, " Patterson *et al.*, May 8, 1888.
" 384,158, " Heady and Patterson, June 5, 1888.
" 386,401, " Heady and Patterson, July 17, 1888.

The introduction of the above patents is objected to, as the same are immaterial and irrelevant.)

Int. 21. What is the main purpose of these connecting mechanisms?

(Same objection.)

Ans. To move the tablet-supporting bar or wing farther
125 than it could be moved by the shoulders on the tablet rods, in order to insure the release of the rod and tablets which are up whenever another key is operated and a second tablet lifted into view.

Int. 22. In the practical operation of these machines, can the shoulders on the tablet rods be themselves depended on to release the elevated rods?

Ans. No; a machine might be so accurately made that at first it will operate as desired, relying on the shoulders alone to move the wing, but when the machine was put into practical use, some of the keys would be used much oftener than others, and the shoulders on the tablet rods belonging to these keys would become worn, so that when one of these keys was operated immediately after an infrequently used key, the shoulder on its rod would not move the wing back far enough to release the tablet rod of the infrequently used key, which was resting on the wing. Thus at cigar-stands, soda fountains and in bar-rooms, where these machines are largely used, the keys of lower denominations, and especially the five and ten cent keys, are the ones most frequently operated, since they represent the values of the larger part of the sales made. In such cases, if no means were provided for moving the wing, excepting the shoulders on the tablet rods, the shoulders on the rods of the five and ten cent keys, as well as the wing itself, at the point where those shoulders engaged it, would very soon become so worn that the operation of either one of these keys would fail to release the tablet rod of any key of the higher denominations, which might happen at the time to be supported on the wing.

Int. 23. In the machines manufactured by your company under the Ritty and Birch patent, has the construction been such that the shoulders on the tablet rods assisted in pushing back the supporting ring?

(Same objection.)

Ans. No, we have so constructed the connecting mechanism between the keys and wing, that the wing will be moved entirely out of the way of the rising tablet rod, so that the shoulder on the rod will not come in contact with the wing until the latter has been re-

leased and moved forward again, or, in other words, returned to its normal position.

126 Int. 24. Has this been the case in all the Ritty and Birch machines made by your company since the year 1882?

(Same objection.)

Ans. Yes, it has.

(Complainant's counsel offers in evidence a certified copy of letters patent of the United States, granted to James Russell, Oct. 10, 1829, for an improvement in bell-hanging, and same is identified as Complainant's Exhibit Russell Patent.

Also, a certified copy of a model, filed in the United States Patent Office, as a part of the application for the above-mentioned letters patent, and the same is identified as Complainant's Exhibit Russell Model.)

Cross-examination by WILLIAM K. RICHARDSON, Esq., of counsel for defendants:

Cross-int. 25. By what name is the cash-register manufactured by your company known to the trade?

Ans. The National cash-register.

Cross-int. 26. You do not call it the Ritty and Birch machine, do you?

Ans. No, sir.

Cross-int. 27. Are there other inventions and improvements in cash-registers embodied in the machines which your company has made since 1884, besides that of the Ritty and Birch patent?

Ans. Yes.

Cross-int. 28. Are these other inventions numerous?

Ans. We own or control at this time thirty-eight different inventions and patents on cash-registering mechanism, not all of which, however, are used in the National machine. There are several different inventions used in the machine as it is now made.

Cross-int. 29. You spoke in your direct examination of your company having made a large number of machines embodying the invention of the Ritty and Birch patent. Do you mean that in all those machines, there is found with the tablets and keys a series of rods, each with a shoulder thereon, and a supporting wing, therefore, which was swung backward as a rod was raised, and then suffered to return beneath the shoulder to hold the rod in its lifted position?

127 Ans. Yes; in each and every machine you will find a series of keys and corresponding tablet rods and supporting wing.

Cross-int. 30. Of whom did your company obtain the Ritty and Birch patent?

Ans. I cannot answer that; being interested only as a stockholder in the company at that time, and not as an officer, I cannot state from whom the Ritty and Birch patent was obtained.

Cross-int. 31. Do you know whether Ritty and Birch ever made any of their cash-register machines?

Ans. I cannot state positively, but I am under the impression that they constructed a few machines before disposing of the patent.

Cross-int. 32. The Ritty and Birch patent states that the elbow *d* in rising aids in pushing back the wing. When did your company first introduce the construction of which you have testified, in which the elbow does not aid in pushing back the wing?

Ans. That was accomplished before I became an officer of the company, prior to November, 1884; the exact date I cannot give.

Cross-int. 33. You stated very positively that no machines are in use in this country employing the indicating mechanism of the Campbell patent. Are you able to state this of your own knowledge?

Ans. I am positive there are no such machines in existence in this country, in actual use, for the reason the National Cash Register Company's agents, being located in all the principal cities of the country, have been requested to inform me of any cash-register, not our make, found in their city. Mr. Campbell showed me the original model, and stated it was the only one made. The agents have never reported having found such a machine.

Cross-int. 34. Is it not the fact that in the Campbell machine a tablet already raised can be released with certainty, by raising the tablet, next lifted, high enough to press against the part of the hook 15 above the notch which holds the projection d^{12}?

(Question objected to by complainant's counsel, for the reason that it does not appear from drawings and specifications of the Campbell patent that it is possible to raise a tablet to the position referred to in the question.)

Ans. It appears in the construction of this device that the second tablet might possibly be raised high enough to release the
128 other; but if this is so, the operated tablet having nothing to support it would return to its normal position, thus leaving neither exposed to view.

Cross-int 35. Is it not rather the fact that while the first tablet would be released, because the first hook is held far enough for that purpose on one side by the pressure of the second tablet projection upon the second hook, yet when the second key was released, the second hook would immediately be snapped back by the spring 18 and would hold up the second tablet?

Ans. It is possible that the machine might be so accurately made, and the tension on the spring adjusted so that the machine might operate in this manner; but in the event of a very slight wear on the said hooks it would be liable to render the machine inoperative. From the shape of the hook, to force it up as high as required to drop the other tablet, it would bind in the bar 16 and require too much power to operate it successfully.

FRANK J. PATTERSON.

Attest: WILLIAM M. HILL,
Special Examiner.

Further Evidence for Complainant,

Taken pursuant to the sixty-seventh rule of the Supreme Court of the United States, in equity, as amended, before me, James A. Renwick, examiner.

NEW YORK, *Jan.* 29, 1890.

Present: William A. Macleod, Esq., of counsel for complainant; William K. Richardson, Esq., of counsel for defendants.

Deposition of Henry B. Renwick.

Direct examination by WILLIAM A. MACLEOD, Esq., of counsel for complainant:

Int. 1. State your name, and whether you have previously testified in this case.

Ans. My name is Henry B. Renwick, and I have previously testified in this case.

129 Int. 2. Have you read the testimony of James Shepard, given in this case?

Ans. Yes.

Int. 3. Mr. Shepard states, at page 100 of the printed Record, referring to the patent in suit: "I understand from the patent that the wing I is the principal thing to effect the desired results." Do you agree with that statement? And if not, state your reasons.

Ans. Certainly not. The desired result is to force that wing so far back that any tablet rod which has its shoulder above it, must necessarily fall, at the time that another tablet rod is being lifted. Now, it is plain that the wing does not get back of itself, but that it is forced back the required distance by the connecting mechanism which connects each and all of the keys with the wing.

Int. 4. Mr. Shepard seems to consider the inclines or shoulders on the tablet rods as part of the connecting mechanism referred to in the first claim of the patent in suit. Do you or not consider said shoulder as part of the connecting mechanism of the claim? And state your reasons.

(Objected to as not accurately representing the testimony of the witness Shepard.)

Ans. I do not; first, because it is evident from the patent that the detents or shoulders in the rod are the things whose operations depend upon the operation of the connecting mechanism; second, because the claim makes the detent or shoulder one distinct or separate element of the claim, and the connecting mechanism another distinct or separate element of the claim.

Int. 5. At page 102 of the printed Record, Mr. Sheperd, in describing the operation of the Ritty and Birch patent, says:

"After a time, the confronting faces of the follower *j*, and the lever *m* disengage each other, but the follower *j* is not then released; on the contrary, it bears against the rounded upper end of the lever *m*, so as to hold the angle lever L stationary for a time, and let back a

trifle until the elbow *d* contacts with the wing I, and just after such contact the lever *m* releases the angle lever L."

Is that, in your opinion, a correct statement of the operation of the devices referred to, and if not, what is their operation?

130 Ans. That is not the description of the mode of operation of the parts in the patent, which states that when the lever *m* or trigger has passed beyond the nose of the bell crank, which is situated, or located, on the follower *j*, the bell crank swings back out of the way and the spring *a'* draws the wing forward under the elbow of the tablet. I cannot perceive how the parts shown in the drawing will operate in the way set forth by Mr. Shepard. When the contact between the lever or trigger *m* and the follower *j* is destroyed by the motion of the parts, *j* is standing at a considerable angle to the horizon hanging on its pivot *h*, and consequently would fall back by gravity, and not rest on the rounded face of *m*. But the question whether Mr. Shepard is right or wrong is an entirely immaterial one so long as the connecting mechanism forces the wing I back far enough to permit the shoulder of the tablet rod above it to fall with certainty, and so long as the disconnecting part of the mechanism disconnects soon enough to permit the top of the wing I to move forward to hold the next succeeding tablet while lifted, or while being lifted.

(Counsel for defendants gives notice that he will endeavor to produce an enlarged model, showing the actual operation of these parts.)

Int. 6. Mr. Shepard states, at page 106 of the printed Record, that the mechanism of the Campbell patent, which patent was heretofore offered in evidence, shows a connecting mechanism common to all of the keys. Please refer to said patent, if you desire, and state whether or not you agree with this statement.

Ans. I do not. It shows what amounts to the same thing as a wing. In Campbell, the shoulders of the tablet d^{12} point in the direction of the row of tablets, instead of perpendicular thereto, which latter is the arrangement of plaintiff's machine; consequently there is a series of hooks, one for each shoulder on the tablets, and these hooks are connected together by a rod common to all of them; if these hooks slid, as they might do, instead of swinging, they would be the supporting rod of the defendants' machine. Now, these hooks are not moved by anything except by the shoulders on the tablet rods, as plaintiff's and defendants' supporting wing and rod would be moved if there was no connecting mechanism in the contrivance.

131 The connecting mechanism of the plaintiff's was devised, as I understand it, for giving to the supporting wing a motion other than that derived from the shoulders or their equivalents on the tablet rod.

Int. 7. Mr. Shepard seems to consider the fact that the wing of the Ritty and Birch patent in suit presses continually against the tablet rod to be the vital point of difference between that wing and the defendants' sliding supporting bar. What is your opinion on that point?

(Same objection as before.)

Ans. In the plaintiff's mechanism the wing does not bear continually against the tablet rods or the shoulders thereon. On the contrary, the connecting mechanism at times prevents its bearing against the tablet rod or its shoulder. The fact that the wing bears against the tablet rod at any time, in the plaintiff's contrivance, is an entirely immaterial incident to the operation of plaintiff's machine; and the fact can be easily demonstrated.

If a small pin be stuck into the frame of the Ritty and Birch apparatus, between the wing and the keys, so as to prevent the wing from coming so far forward, under the operation of its spring, as to be capable of ever striking the tablet rod, but still permitting the wing to swing so far forward as to get under the shoulders or detents of the tablet rods so as to hold them up, the whole apparatus will produce precisely the same results and in the same way as if the wing at times bore against the tablet rod. In defendants' machine the supporting bar does not bear against the tablet rod when under the control of the spring which moves it sideways, but is prevented from bearing against it by means of a stop, just as the wing of plaintiff's would be prevented from bearing against them, provided the pin stop, which I have spoken of in the prior part of this answer, were put into the plaintiff's machine. It is obvious that no person could avoid the plaintiff's patent by introducing such a stop-pin as I have before spoken of, into the machine.

Int. 8. At pages 114 and 115 of the printed Record, certain patents are named which were put in evidence and commented upon by Mr. Shepard. Will you please consider these patents seriatim, and state what bearing they have, if any, in your opinion, on the novelty of the Ritty and Birch patent in suit?

132 Ans. I had these patents furnished me, and examined them some weeks ago.

The patent to Deming describes a typewriter. It has no tablet; no tablet rods to be elevated and depressed; no wing or equivalent. It does have a contrivance common to all the keys, so that at each touch of any key the printing roller or cylinder shall have a step-by-step motion, so as to form the spaces between the letters and also the words. The thing described in this patent has nothing at all to do with the plaintiff's patent, or the invention described therein and referred to in the first claim thereof.

The patent to Sholes and Glidden shows a bank of keys, each and any of which will operate a ratchet arrangement for moving paper in a printing machine. It has no tablets; no tablet rods; no shoulders; no supporting wing; no disconnecting-connecting mechanism; and has not the slightest bearing upon the novelty of the invention referred to in this patent in suit.

The patent to Allen also describes a typewriter. It has no tablets; no tablet rods; no shoulders; no supporting wings or its equivalent; and like the former patents no disconnecting-connecting mechanism. It has mechanism, actuated by any one of the bank of keys, to regulate the feed of the paper. It is needless to say that

this patent has no bearing whatever upon the novelty of the invention set forth in the plaintiff's patent.

The patent to Capron describes an annunciator such as was used in hotels prior to the introduction of electrical annunciators. It has no keys of any kind; no tablet rods; no shoulders on them; but it has a bell-ringing mechanism which is in some respects very similar to that shown in Fig. 3 of the Ritty and Birch patent, which construction is not in dispute herein. I fail entirely to see in this patent anything which bears at all upon the novelty of the combination which is referred to in the first claim of the Ritty and Birch patent in suit.

The patent to Plumb is a patent for an adding machine; a machine for performing the same duty as the registering apparatus shown in the drawings of the Ritty and Birch patent, so as to add up, within the case of the machine, the figures corresponding to those upon the various keys. It has, therefore, a bank of
133 keys like those of Ritty and Birch, but as it has no tablet rods, shoulders, supporting wing, or connecting mechanism, I fail to see that it has any bearing upon the novelty of the first claim of the Ritty and Birch patent. The patent to Forrester also describes an adding machine. It has a bank of keys; but as it has no tablet rods or shoulders or wing, or mechanism for actuating a wing, or its equivalent, it is clear to me, at least, that it has no bearing upon the novelty of Ritty and Birch's invention.

The patent to Borland and Hoffman also describes an adding machine. It has a bank of keys and means connected therewith for moving a pointer or hand of a dial. I have endeavored, unsuccessfully, to find any tablet rods or shoulders or supporting wings, or anything like them, in this adding machine, and, of course, am of the opinion that it has no bearing upon the novelty of the first claim of the Ritty and Birch patent.

The next patent is that to Windmüller and Ahrens, which is a patent for a register and indicator for bar-rooms. This patent shows a mechanism for ringing a bell much like that described in the Ritty and Birch patent. It does not show a bank of vibrating keys, but, on the contrary, a series of pulls, like ordinary bell pulls. It also shows a series of indicators, as the patent calls them, which are quadrangles one-half blank and one-half with figures upon them. These quadrangles slide in grooves in the face of a box which has in it openings corresponding with one-half of the surface of the quadrangles. When any one of the quadrangles is pulled downwards by actuating its corresponding bell pull, it exposes the number painted on its upper half; when it is pulled upwards, it exposes the blank half of its surface. The bell pulls are connected by a curious arrangement of cords and pulleys with these indicators. When a pull is pulled, it hauls down its corresponding indicator, so as to expose its number; and when another bell pull is pulled it hauls down and exposes the number of its corresponding indicator, at the same time lifting up the previously exposed indicator and concealing the number of the latter.

There are no tablet rods in this contrivance; no shoulders on

tablet rods; no supporting wing or its equivalents or substitutes; and no connecting mechanism moving such a wing or rod;
134 consequently, this patent discloses nothing which has any bearing on the novelty of the first claim of the plaintiff's patent in suit. If the suit had been brought upon the fifth claim of the patent in suit, the patent to Windmüller and Ahrens would have been in point, as a reference, which would narrow the fifth claim.

The patent to Howie is for a bar-room recorder, but has no indicating tablets; no shoulders thereon; no wing or other supporting device; and no connecting mechanism, connecting the keys with a wing or its substitute or equivalent. The apparatus shown in this Howie patent has a series of keys mounted on sliding rods, and when any one of the keys is pushed down it rings a bell, but does not expose a tablet. If this patent were set up with reference to a suit brought under the fifth claim of the patent to plaintiff, it would be in point, but it has no bearing whatever upon the novelty of the first claim of the patent in suit. None of the patents in this case, prior to Ritty and Birch,—include all that have been referred to by myself and others,—discloses even the idea of a connecting mechanism operated by pressing upon any one of a whole bank of keys to throw a supporting bar or wing from beneath the shoulders, or any one shoulder of a row of tablet rods, nor an apparatus capable of throwing such a wing or rod farther back or out of the way than the shoulders on the tablet rod will throw it.

Cross-examination by WILLIAM K. RICHARDSON, Esq., of counsel for defendants:

Cross-int. 9. Are you still of the opinion that the result accomplished by the Ritty and Birch mechanism was not new?

Ans. I am, so far as the dropping of a tablet rod with certainty is concerned; because that result is accomplished by the English patent to Pottin.

Cross-int. 10. The novelty of the claim, then, residing in the combination of mechanism therein set forth, are you of the opinion that a prior patent, in order to have anything to do with the construction of that claim, must show every element there enumerated?

Ans. Yes; or equivalents or substitutes for each of such elements.

Cross-int. 11. You have stated that, in your opinion, the
135 connecting mechanism was the only single element in the claim not found in prior patents. Now do you think that a prior patent would have no bearing upon this claim, which showed a connecting mechanism common to a series of keys, and all the other elements of the Ritty and Birch patent, save one?

Ans. I do not know that I understand your question. There is no prior patent which shows a connecting mechanism, and all the other elements of the Ritty and Birch patent save one, and combined to operate as they describe. If you will show me such a structure as supposed by your question, I will endeavor to answer the question definitely.

Cross-int. 12. Are not, in your opinion, typewriters and adding machines of a cognate character with registering machines?

Ans. Typewriters are not of a cognate character with registering machines; adding machines do register, but do not expose tablets corresponding to the keys actuated. Both the plaintiff's and defendants' contrivances are registering machines, but a registering apparatus is not in controversy herein.

Cross-int. 13. Do you think that when the combination in a registering and indicating machine of a series of indicating tablets, operated by a series of keys, a series of rods each provided with a shoulder and carrying tablet, and a supporting wing, was old, it required the exercise of invention to add to that combination a connecting mechanism common to the series of keys, in the shape of a bar common to all of the keys, arms from said bar, and a lever operated by the working of said arm, when that precise construction was shown in the well-known typewriting machines for the purpose of allowing any one of a series of keys, when operated, to suffer a paper carriage to be moved along by a spring or weight?

Ans. The precise connecting mechanism of the plaintiff is not found in any of the typewriter devices. The typewriters have devices connected with all the keys for pulling a pawl out of a rack. Now, supposing that all the elements of the plaintiff's first claim, or their equivalents or substitutes, except the connecting mechanism, were old and combined in the same way as in plaintiff's patent; and suppose that mechanism, substantially like plaintiff's connecting mechanism, were, as is the case, substantially old, for the
136 purpose of ringing a bell when any one of a number of keys was struck, then I should be confident that Ritty and Birch had made an invention when they conceived the idea of moving a wing or rod to a greater distance than it could be moved by shoulders on the rods, so as to permit the rods to drop with certainty; and had, in carrying out that idea, combined this connecting mechanism with a wing or supporting bar and tablets and shoulders, all old, so as to produce the desired result.

Cross-int. 14. So far as the operation of the connecting mechanism is concerned, did it work any differently when used to push back the wing, than it did when used to push back the lever of a bell hammer?

Ans. No, not when considered alone and by itself, but in the one case it operated to ring a bell, and in the other to let tablet rods fall; because in the one case the connecting mechanism was combined with a hammer of a bell, and in the other with a wing or bar which would support any one of a number of tablet rods.

Cross-int. 15. Have not the patents cited by Mr. Shepard in any way modified the opinions expressed by you in your previous testimony as to the invention referred to in the first claim of the Ritty and Birch patent?

Ans. They have not.

HENRY B. RENWICK.

Attest: JAMES A. RENWICK, *Examiner.*

137 DEFENDANTS' EXHIBIT POTTIN PATENT, H. C. M., Sp'l Ex'r.

[British coat of arms.]

A. D. 1877, 28th May. No. 2076.

Cash-register Apparatus.

Letters patent to Henry Pottin, of Rue Turbigo, No 79, Paris, gentleman, for the invention of "an improved cash-register apparatus."

Sealed the 9th November, 1877, and dated the 28th May, 1877.

Provisional Specification Left by the said Henry Pottin at the Office of the Commissioners of Patents on the 28th May, 1877.

HENRY POTTIN, of Rue Turbigo, No. 79, Paris, gentleman.

"An Improved Cash-register Apparatus."

The improved cash-register apparatus which forms the subject of my invention consists of a casing of any convenient form which may be placed at a counter in a shop, or in a banking or other office. Along the side of this casing next the operator there is a row of keys or buttons, each corresponding to some unit of the sums to be registered. Each key or button has a stem with a spring, which keeps it up, except when it is depressed by the finger, and this stem has a spring pawl engaging with a ratchet wheel, so that every time the key or button is depressed the wheel is moved one tooth round, and a dial thereon indicates the number of actions of the key or button. These ratchet wheels are made with carrying apparatus of ordinary construction, so that when one has made a complete
138 revolution the next is moved one division, thereby carrying one from the one denomination to the next above.

The ra-chet wheels are all within a compartment of the casing, which may be locked, so that a principal having in the first place set all these dials to zero can lock this compartment and so prevent the wheels being tampered with until he again unlocks the compartment and reads off the totals registered on their dials. The stem of each key or button also bears on one end of a lever, the other end of which carries a plate or card which usually is hid behind a screen in the front side of the casing, but which, when a key or button is depressed, is caused to rise and present itself behind an opening in the screen, shewing to the person dealing with the cashier the amount registered by him, the movement of the lever also causing a hammer to strike a bell.

The levers which carry these plates or cards are pressed by springs against partitions which separate them, so that there is sufficient friction to retain them in position even when the keys or buttons that have operated them return to their normal condition. But in order to replace all the indicating plates or cards simultaneously so

as to put them ready for giving a fresh indication, the levers which carry them are arranged under cross-bars connected to a treadle, so that the operator by depressing the treadle causes all the levers to descend, and on releasing the treadle from the pressure of his foot, it with the bars connected to it is raised by a spring.

Specification in Pursuance of the Conditions of the Letters Patent Filed by the said Henry Pottin in the Great Seal Patent Office on the 27th November, 1877.

HENRY POTTIN, of Rue Turbigo, No. 79, Paris, gentleman.

"*An Improved Cash-register Apparatus.*"

The improved cash-register apparatus, which forms the subject of my invention, consists of a casing of any convenient form which may be placed at a counter in a shop, or in a banking or other office. Along the side of this casing next the operator there is a row of keys or buttons, each corresponding to some unit of the sums to be registered. Each key or button has a stem with a spring which keeps it up, except when it is depressed by the finger, and this stem
139 has a spring pawl engaging with a ratchet wheel, so that every time the key or button is depressed the wheel is moved one tooth round, and a dial thereon indicates the number of actions of the key or button. These ratchet wheels are made with carrying apparatus of ordinary construction, so that when one has made a complete revolution the next is moved one division, thereby carrying one from the one denomination to the next above.

The ratchet wheels are all within a compartment of the casing, which may be locked, so that a principal having in the first place set all these dials to zero can lock this compartment and so prevent the wheels being tampered with until he again unlocks the compartment and reads off the totals registered on their dials. The stem of each key or button also bears on one end of a lever, the other end of which carries a plate or card which usually is hid behind a screen in the front side of the casing, but which, when a key or button is depressed, is caused to rise and present itself behind an opening in the screen, shewing to the person dealing with the cashier the amount registered by him, the movement of the lever also causing a hammer to strike a bell.

The levers which carry these plates or cards are pressed by springs against partitions which separate them so that there is sufficient friction to retain them in position even when the keys or buttons that have operated them return to their normal condition. But in order to replace all the indicating plates or cards simultaneously so as to put them ready for giving a fresh indication, the levers which carry them are arranged under cross-bars connected to a treadle, so that the operator, by depressing the treadle, causes all the levers to descend, and on releasing the treadle from the pressure of his foot, it with the bars connected to — is raised by a spring.

Description of the Drawings.

(Here follow diagrams marked pp. 139ᵃ & 139ᵇ.)

The figures on sheet I of the accompanying drawings shew a cash-register apparatus according to my invention in a form suitable for an office or shop. A modified form suitable for large establishments, such as cafés or taverns, is shewn on sheet II.

Referring in the first place to sheet I, Fig. 1 is a front view; Fig. 2, a transverse section; Figs. 3 and 4 are respectively a front
140 view and transverse section of the registering gear drawn to an enlarged scale; and Figs. 5 and 6 are respectively a plan and elevation of the bell gear.

The casing of the apparatus, which may be of wood, is fronted by an inclined plate of glass G, and has at its hinder side two rows of keys or buttons b, b^1, corresponding respectively to pence and shillings, or such other denominations as may be required. Each of the buttons b, b^1, is kept up by a helical spring c surrounding its stem, which extends downwards and has jointed to it a pawl a, pressed by a spring e, to engage with the teeth of a ratchet-wheel d, so that the wheel is turned one tooth every time the button b or b^1 above it is depressed. The ratchet wheel is prevented from turning backwards by a pawl e pressed into gear by a spring f. At the side of the wheel d is mounted a small ratchet wheel d^1, which is turned one tooth for each complete revolution of the wheel d, a notch or deepened tooth x being for that purpose provided in d. When the register of these counter-wheels has been noted they are turned to zero by a needle inserted into a hole g, pierced through both wheels and the back plate. When one of the buttons b or b^1, is depressed, it acts on the lever g, or g^1, so as to raise a card or plate p or p^1, up from behind screens q or q^1, presenting through the glass G an indication of what is registered. The levers g, g^1, work respectively on axes o, o^1, between separating plates h, against which they are pressed by the helical springs k, k^1, producing friction such that, after any one of the cards p, p^1, has been raised, it remains up notwithstanding that the key b or b^1, that raised it is released. The front ends of the levers g work in slots in a plate m.

After a number of the cards p, p^1, have been raised, they are simultaneously depressed by the treadle u so as to be ready to give a fresh set of indications in the following manner. Two bars n, n^1, extend one over each set of the levers g, g^1; these bars are connected together at their ends to bent levers l, pivoted on o^1, and held up by the spring r^4; a bent rod j jointed to the treadle u is held up by the spring r^3, and has mounted on it a pawl i pressed forwards by the spring r^2 against a stop at its joint. As the pawl i catches over the bar n when the treadle u is depressed, both bars, n, n^1, and both sets
of levers, g, g^1, are depressed; but when u has thus been de-
141 pressed a sufficient distance the pawl i escapes its edge, and thereupon the spring r^4 raises the bars n, n^1, leaving the lever g, g^1, free to be again operated on. When the treadle u is released the spring r^3 raises it with the rod j, and the pawl i escaping the

bar n is again ready to catch on its upper edge. On one of the bent levers l is a stud v, which both in ascending and descending acts on the hammers k^1 of the bell t.

Referring now to sheet II, Fig. 1 represents a transverse section; Fig. 2, a back view; Fig. 3, a front view; and Fig. 4, a sectional plan of cash-register apparatus, according to my invention, suitable for large establishments: t, t^1 are two sets of keys; the one may be for pence, and the other for shillings, or for such other denominations as may be dealt with. These keys are connected respectively to levers b, b^1, pivoted at o, o^1; on each of these levers is a small roller g, which bearing against a vertical curved bar e guides the end of the lever to move in a vertical plain; there is also on each lever another small roller g^1 bearing against an inclined bar d, d^1, which it pushes aside by its ascent when the key of the lever is depressed. These inclined bars d, d^1, project from bars e, e^1, which are jointed to rods f, f^1, respectively; thus every time one of the keys t is depressed the bar f is caused to make a stroke; and every time one of the keys t^1 is depressed the bar f^1 is caused to make a stroke. The extent of stroke depends on the amount of inclination given to the inclined bars d, d^1, which is made different for each key of the set increasing from the key 1 upwards. The bars f, f^1, by pins g, g^1, work levers h, h^1, jointed to racks i, i^1, which gear with pinions j, j^1, respectively. These pinions are loose on the axis x, x^1, of indices, but carry pawls k, k^1, which engage with ratchet wheels l, l^1, fixed on these axes so that when the pinions j, j^1, move in the one direction they turn the ratchet wheels and indices with them, but escape in the other direction, the ratchet wheels being prevented by spring pawls from moving backwards.

When the index axis x makes one complete revolution it carries to the next axis x^1 by moving its ratchet wheel one tooth in the following manner. On the axis x is fixed a snail cam m on which a lever u is caused to bear by a spring r. When the index of x reaches zero the bearing end of the lever u drops, and the other end by means of a pawl p turns the ratchet wheel j^1 one tooth. In like manner the index of x^1 carries to that of x^2, and the latter may, as described with reference to the apparatus shewn on sheet I, carry to an inner or outer circles of the figures. The cards or plates which serve to shew what amount is registered at each operation are worked in such a manner that each card remains in view at the aperture of the case until a key of the same set is depressed. Each of the levers b b^1, is connected by a rod s, s^1 to rods u, u^1, which carry the cards. Each of these rods has an inclined projection or nose v, shewn to an enlarged scale along with parts related to it in elevation at Fig. 5, and in plan at Fig. 6.

142

When any one of the rods u rises, its nose v slides past the end of a counterweighted lever z which is mounted on a horizontal bar y and so pushes the bar to the one side in opposition to a spring r^1, which immediately on the nose v having risen above the bar draws the bar back so as to catch under the nose and so hold up the rod and card until on the depression of another key of the set the bar is

again moved aside from under the nose e, whereupon the rod u and its card drop, escaping the lever z, which is employed to avoid the necessity for extreme precision, in the notching of the bar y. The bars y, y^1, can be pulled aside at any time by hand applied to buttons projecting from them outside the casing so as to let any card drop when desired. Each of the rods s, s^1, has a branch z^1, which catches under the bar k^1, attached to arms which turn on an axis o^2, and which every time a key is depressed causes a bell T to be struck.

Having thus described the nature of my invention, and in what manner the same is to be performed, I claim—

First. The use of cash-register apparatus, substantially as herein described, wherein the movement of a button or key corresponding to the amount to be registered effects simultaneously the proportional movement of a counter to record the amount and the visible exhibition of the amount, giving also when required an audible signal of the act of registration.

Second. In apparatus such as is above referred to employing two or more sets or ranges of buttons or keys, one for each denomination, and connecting their respective counters so as to carry
143 from each denomination to the next above, substantially as herein described.

In witness whereof, I, the said Henry Pottin, have hereunto set my hand and seal, this twenty-seventh day of October, in the year of our Lord one thousand eight hundred and seventy-seven.

HENRY POTTIN. [L. S.]

Witness:

CH. ARMENGAUD,

Civil Engineer, 23 Boulevard de Strasbourg, Paris.

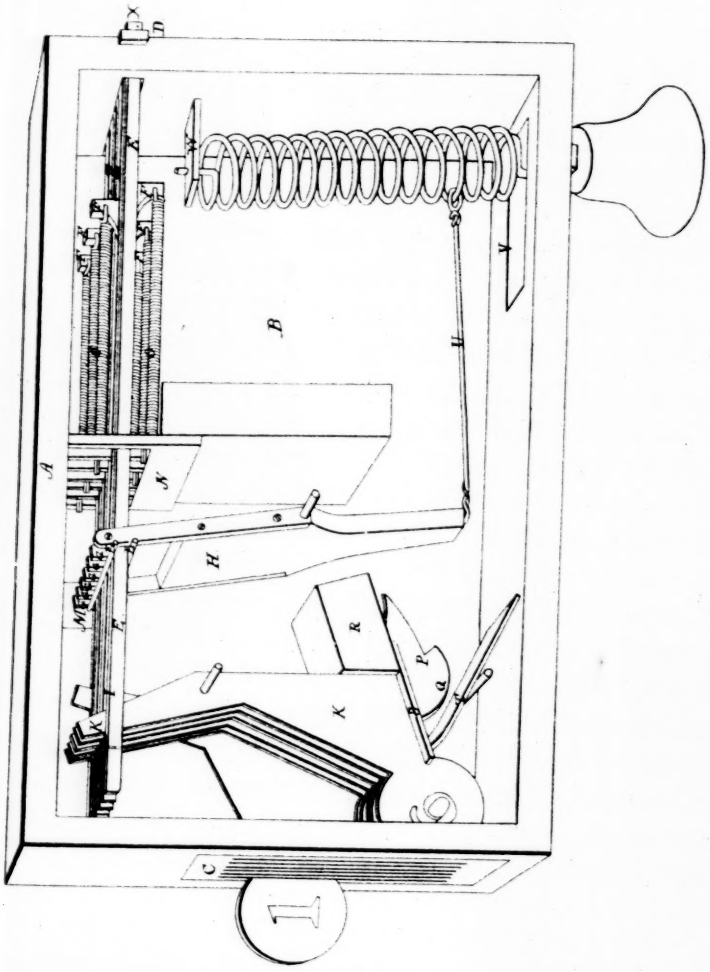
London: Printed by George Edward Eyre and William Spottiswoode, printers to the Queen's most excellent majesty. 1877.

No. 155
Matt. Pash. Register Co
v.
Boston Cash Indicator & Co
p. 1144

J. RUSSELL.

Annunciator.

Patented Oct. 10, 1829.



144 COMPLAINANT'S EXHIBIT RUSSELL PATENT.

Letters Patent of the United States, Dated Oct. 10, 1829.

Granted James Russell, of New York city.

Improvement in Bell-hanging.

Specification.

The schedule referred to in these letters patent and making part of the same, containing a description in the words of the said James Russell himself of his improvement in bell-hanging.

Be it known that I, James Russell of New York and State of New York, have invented a new and useful improvement in bell-hanging, and that the following is a full and exact description of the said improvement as invented by me.

(Here follows diagram marked p. 144*a*.)

A box, or case A is constructed about twenty inches long by twelve inches wide; the depth is regulated according to the number of rooms in the building. The back B, to which the fixtures are attached, and which lies against the wall, is plain. At the end of the case is a plate of brass or other metal C, having grooves cut in it, in number equal to the number of rooms in the building from which bell wires lead. At the opposite end of the case and near the top, is a plate of metal D, through which are cut small mortises in number equal to the grooves in the plate C, into which work the ends of the bars E. Each bar is about the length of the case, having near its end a projecting piece F, to which is attached one end of a spiral spring.

Near the centre of the bar on its upper surface, is another projecting piece G, coming in contact with the lever H, hereinafter described. At the other end of the bar is a groove I into which runs the upper end of the index K. There are as many bars as there are grooves in the plates of metal, and they are all formed as the one just described and kept in their place from moving up or down or too far towards the end of the box by the stubs L on
145–150 the plate M, and from touching each other by the metal plate N grooved similar to plate C, to which are attached the ends of the spiral springs O. The index K is made of metal, having a notch P at the lower extremity and a round shoulder or projection Q; it works on a pivot and has the number of the room painted on it. There are as many indexes as there are grooves in the plate C, and through which the indexes pass and all of the same form. At the back of the indexes is a block of wood R, having on its under side a metal plate S, grooved similar to plate C, to keep the indexes apart and in their places. Directly under

the indexes is an iron catch T, working on a pivot and which catches in the notch P of the index. On the front of the case is a crank leading in under the catch to raise it and throw it out of the notch at pleasure, so as to let in the index.

The lever H is made of wood and metal, in width equal to the depth of the case, and in length nearly equal to the width of the case; its upper end is open, having on its top a cross-piece of metal that lies against the projecting piece of the bar G. The lever works on a pivot and is connected to the spring and bell by a wire U.

The lower end of the spring, to which the bell is attached, works in a mortise V cut in the bottom of the box for that purpose. The upper end is fastened to the stub W. The wires leading from the rooms to the case are attached to the bars at X.

When a person draws the wire, he sets every part of this machine in motion simultaneously by drawing forward the bar E, which throws out the index and draws forward the lever which agitates the bell and at the same time the catch falls into the notch and holds the index out of the box till the servant sees it, who then lets it in by the crank, or it is let in by the next person who rings.

The great advantages of this improvement are that less room is required, as one case and one bell are sufficient for a great number of rooms, and the indication of the person ringing is more certain. It is well adapted to shops, as it takes up but little room.

[SEAL] JAMES RUSSELL.

Witnesses:

C. H. W. WHARTON.
THOS. B. DYER.

(No Model.) 2 Sheets—Sheet 2

J. RITTY & J. BIRCH.

CASH REGISTER AND INDICATOR.

No. 271,363. Patented Jan. 30, 1883.

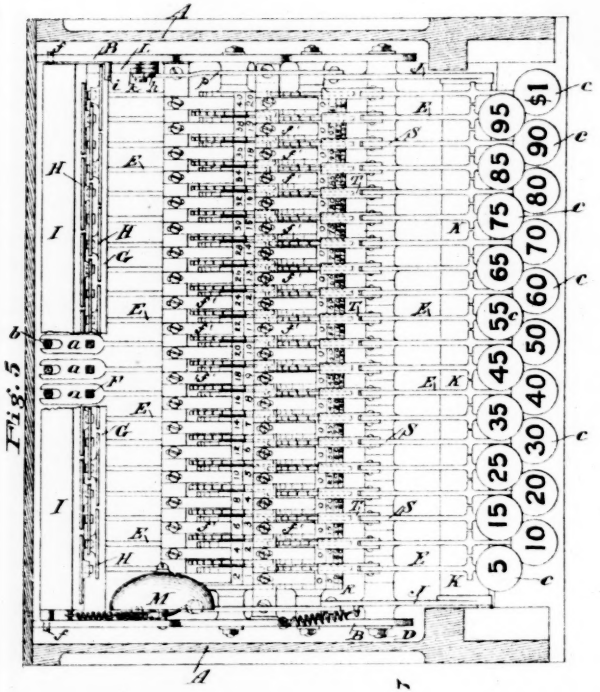


Fig. 5

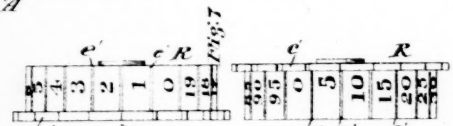


Fig. 7

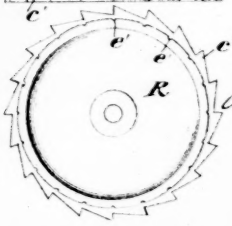


Fig. 6

Witness.

Jas. A. Meyer

Louis Stimson Jr.

Inventors

James Ritty & John Birch

by Stim & Cook

their Attys.

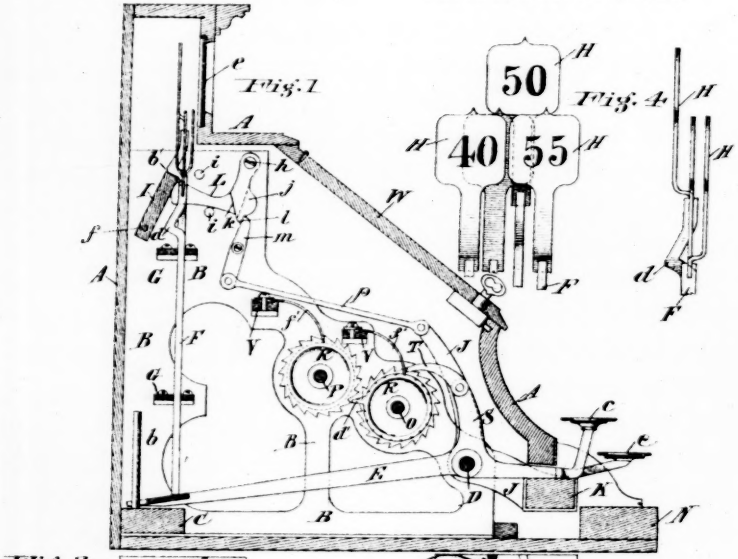
No. 155. Nickel Cash Registers Co. 150 Pat. C. P. & P. Co. 1881

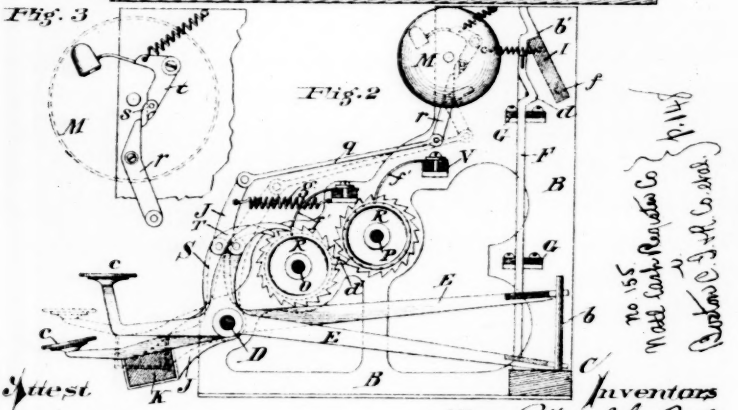
(No Model.) 2 Sheets—Sheet 1.

J. RITTY & J. BIRCH.

CASH REGISTER AND INDICATOR.

No. 271,363. Patented Jan. 30, 1883.





Attest.
Geo. A. Mayo
Louis Steinmetz

Inventors
James Ritty & John Birch
by Stimpson & Peck
their attys

No. 155 Model Cash Registers Co
Dayton O. C. P. Co. stock

151 UNITED STATES PATENT OFFICE.

JAMES RITTY and JOHN BIRCH, of Dayton, assignors to Jacob H. Eckert, of Cincinnati, Ohio.

Cash Register and Indicator.

Specification forming part of Letters Patent No. 271,363, dated January 30, 1883. Application filed February 15, 1882. (No model.)

To all whom it may concern:

Be it known that we, James Ritty and John Birch, both citizens of the United States, and residing at Dayton, Montgomery county, Ohio, have invented certain new and useful improvements in cash registers and indicators, of which the following is a full, clear, and exact description.

Our invention relates to an improvement in cash registers and indicators designed for the use of store-keepers and others as a means of accurately registering the total cash receipts for any given period of time—as a day, for instance—and for indicating to the customers that the amount paid has been registered by disclosing to their view such amounts upon figured tablets.

The arrangements of the parts and operation of the machine are such that no tablet can be exhibited without its value being counted upon the registering mechanism, and whenever any tablet is disclosed it remains so until the machine is operated to disclose a second tablet.

The novelty of our invention consists in the construction, combinations, and arrangements of the various parts, as will be herewith set forth and specifically claimed.

(Here follow diagrams marked pp. 148 & 150.)

In the accompanying drawings, figure 1, sheet 1, is a sectional side elevation of our improved machine, looking toward its right-hand end. Fig. 2, sheet 1, is a corresponding view, looking toward the left-hand end of the machine. Fig. 3, sheet 1, is an enlarged view of the bell, operating-trip, and hammer. Fig. 4, sheet 1, is a front and side elevation of a group of indicating-tablets. Fig. 5, sheet 2, is a plan view of the entire mechanism. Fig. 6, sheet 2, is a side elevation of one of the registering-disks. Fig. 7, sheet 2, are plan views of a pair of registering-disks.

We provide any suitable box or case, A, ornamented as desired, and of the general shape indicated, though its shape and ornamentation may be varied infinitely. In this outer case is fitted a metal frame-work, consisting chiefly of two upright sides, B, united by a cross-bar, C, and by the shafts and bars which support the operating mechanism.

In the lower portion of the frame, and extending horizontally across it, is a rod or shaft, D, supported by and aiding to connect

the sides B of the frame. Upon this shaft are hung a series of parallel keys, E, of metal, made heavier in the rear, so as to remain in and return to the position indicated in Fig. 1 by their gravity alone, without the use of springs or other devices. In the present instance twenty of these keys are shown, though any number may be employed. Each key has upon its front end, which extends through and projects from an opening in the front of the case or frame, a button, *e*, having marked upon it a figure to correspond with the value intended to be indicated and registered whenever that key is operated by depressing the button. In a machine with twenty keys the first button to the left would be numbered 5, the second 10, and the third 15, to represent five, ten, and fifteen cents, and so on progressively. As these buttons are about three-quarters of an inch in diameter, it would make the machine unnecessarily wide to arrange the whole series side by side in one bank; so we have arranged them in two banks, the one above the other, as clearly seen in Figs. 1, 2, and 5. As seen at *a* in Fig. 5, sheet 2, the rear end of each key is flattened and slotted at its outer end, so as to embrace vertical guide-pins *b*, set in the bar C, and which aid the shaft D in preventing lateral play or twist of the keys.

Resting upon the flattened ends of the keys are vertical metal rods F—one for each key—which pass and have vertical play through perforations in metal guide bars G, extending across and supported by the sides B. These rods may be any shape in cross-section, though we prefer to make them square, with square perforations in the guide-bars G. The upper portion of each rod, just above the upper bar, G, is bent to form a knuckle or shoulder, *d*, upon its rear side, which has beveled or inclined operating-faces, for a purpose to be presently explained.

Suitably secured to the top of each rod is a tablet, H, of thin flat metal, and upon the face of each tablet is a number corresponding with the number upon the key over whose rear end the rod
152 of that tablet rests. Thus the tablet of the rod resting upon the key whose button is marked 5 is likewise marked 5, and so on through the series. In order to get the tablets into as narrow a space as possible, and thus not make the machine wider than necessary, their stems are bent so that the tablets can overlap each other, as shown in Fig. 4, and yet each can be operated without interfering with another.

In the upper portion of the case is a large horizontal opening extending across the front of the case and covered with transparent glass *c*, Fig. 1, and when the keys are in their normal position of rest, with the rods F resting upon their rear ends, all of the tablets are hidden from view below the lower edge of the opening *c*; but when any key is pressed down by means of its button the rod of that key is raised and its tablet exposed to view through the glass *c*.

In Figs. 1 and 4 one of the tablets is thus shown raised up and exposed to view. Now, it is an important feature of our machine that after a key has been operated and its tablet exposed to view such tablet shall remain up and exposed until another key is operated, whereupon the first falls back out of view and the second

remains exposed, and so on, thus always keeping in view the tablet of the key last operated. To effect this result we pivot, by means of trunnions or a shaft extending between the sides B, a forwardly-inclined wing, I, pivoted at its lower edge, as at *f*, and resting at its upper edge against the rear sides of the upper portions of the rods F. This wing extends back of all of the rods, and is free to vibrate on its pivotal axis *f*. It is yieldingly held against the rods by any suitable spring, a spiral spring being shown for that purpose in Fig. 2, secured at one end of the wing and to the side B of the frame. Just on the inner sides of the frames B, and pivoted upon the shaft D, are flat arms J, extending upward and rearward and downward and forward of their pivotal points. The front ends of these arms extend into the opening made for the keys in the front of the case A, and are connected by a bar, K, extending entirely across this opening and resting up against the under sides of all the keys. Of course when any one of the keys is depressed the bar K is likewise carried down, and the upper portions of the arms J are vibrated forward, as seen in Fig. 2, where the dotted lines represent the normal position of the arms and one of the lower bank of keys, and the unbroken lines show the key depressed, carrying down the bar K and drawing forward the arms J. To return the bar J when the key is released, and to assist the key itself to return, any suitable spring may be employed. We have shown one, *g*, Fig. 2, connected at one end to one of the arms J and at its other end to the side of the frame B.

Pivoted at *h* upon the right-hand side of the frame B, Fig. 1, is a bell-crank tripping-arm, L, with the rear end rounded and resting against the upper portion of the front side of the wing I. Its vibration is limited by two pins or detents, *i*, as shown, and upon the same pivot, *h*, is hung a follower, *j*, whose lower end extends below the elbow of the bell-crank, and whose rear edge rests against a shoulder, *k*, upon the bell-crank. The lower end of this follower has a beveled engaging-nose, *l*, against which the upper end of a trigger, *m*, pivoted at or near its middle, as at *o*, to the side B rests. The lower end of this trigger is connected to the upper end of the arm J on that side of the machine by a link, *p*. The opposite arm, J, Figs. 2 and 3, is connected by a similar link, *q*, to similar tripping mechanism, *r s t*, for operating the hammer *u* of a bell or gong, M, which is secured in any suitable manner to the side B of the frame.

Now, the operation of thus much of the machine is as follows: When any key is pressed down its rod and tablet are raised, and the elbow *d* of the rod, in rising, aids in pressing back the wing I; but to aid the elbow the arm J on the right, which, as before explained, is drawn forward whenever a key is pressed, imparts motion to the link *p* and trigger *m*, whose upper end, acting on the nose *l* of the follower *j*, presses it back, and with it the bell-crank L, which is thus forced against the wing and presses it back. Now, the parts are so arranged that when the lower side of the elbow *d* is just above the top edge of the wing the key has completed its downward stroke, and is arrested by the front bar, N, of the case, the trigger *m* has passed beyond the nose *l* of the bell-crank, so that the latter swings

back out of the way, and the spring a' draws the wing forward under the elbow d, so that the latter rests upon the upper edge, as seen at b', Figs. 1 and 2, and there remains, thus retaining the tablet and rod of the operated key elevated. Now, upon releasing the key it falls backward to its normal position by gravity, and is aided by the spring g, Fig. 2, which returns the bar K and arms J. The follower j, being free to swing forward without moving the bell-crank, permits the trigger m to flip it up and pass under its nose to its normal position. During this operation the opposite arm J, Fig. 2, has in like manner actuated the hammer of the gong, which is sounded every time a key is depressed to its farthest limit, and only then, and thus gives notice to the customer that the machine has been properly operated. Whenever the same key is successively operated its rod and the tablet remain up and exposed to view; but when a different key is operated the tablet of the previous one is released and falls back out of sight, and the tablet of the operated key remains up and exposed.

The above constitutes the indicating mechanism, and we will now proceed to describe the registering or recording mechanism.

153 Upon two parallel transverse shafts, O and P, having their ends secured in the sides B, and aiding to support the same, are strung a series of disks or wheels, R, Figs. 6 and 7. Those on each shaft abut the one against the other, but are loose upon the shaft, so as to revolve thereon. These wheels are in pairs, one over each key of the machine—that is to say, there are two wheels over each key, one on the shaft P and one on the shaft O, the two being in line and with their peripheries close to each other. The wheels on the shaft P we will designate as "dollar wheels" and those on the shaft O as "cent-wheels." Each wheel has at one side a ratchet c', projecting slightly above the periphery, and having twenty teeth. The ratchets on the cent-wheels are all on one side—say the right-hand side thereof—while those on the dollar-wheels are all on the opposite or left-hand side. This arrangement is effected so as to bring the two sets of wheels close together.

Upon each of the cent-wheels there is a radially-projecting pin or stud, d', Figs. 1 and 2, secured in any suitable manner, and arranged in line with the ratchets on the dollar-wheels, so that on every complete revolution of the cent-wheels this pin comes in contact with one of the teeth of the ratchets on the dollar-wheels and revolves them one notch, or a twentieth of a revolution.

Projecting up from each key, just above or in front of its pivotal point, is an arm, S, to the upper end of which is pivoted a dog, T, whose nose engages with the ratchets of its corresponding cent-wheel, as clearly seen in Figs. 1 and 2. Now, as any key is depressed its arm S is drawn back, carrying with it its dog, and the length and proportion of the parts are such that a full stroke of the key only draws its dog back sufficiently to pass one tooth of the ratchet, and no more. This motion does not disturb the wheel; but as the key falls back after being released the dog is pushed forward and turns the cent-wheel one-twentieth of a revolution, and thus through the whole series of keys. Each wheel of both sets is

divided into twenty equal transverse divisions on its periphery, and these are separated by shallow gutters e'.

Upon transverse bars V, extending between the sides B, and arranged over and slightly back of each set of wheels, are adjustably secured by set-screws curved flat springs f', whose lower ends rest in the before-mentioned gutters e'. These springs form brakes for the wheels and prevent their being turned more than one notch at each operation of the keys.

The manner in which a record is kept of the operations of the keys is as follows: Commencing with the dollar and cent wheels over the five-cent key, we mark the first division of the cent-wheel 0, the next 5, the next 10, and so on up to 95, as seen clearly in Fig. 7. On the dollar-wheel the first division is 0, the next 1, 2, and so on up to 19. Of the wheels over the ten-cent key, the cent-wheel is marked in a series of 0, 10, 20, and so on progressively, and the dollar-wheel is marked in a series of 0, 2, 4, 6, and so on progressively. Of the wheels over the fifteen-cent key, the cent-wheel is marked in a series increasing by three, and so on through the whole set.

To keep a register of the machine, all the wheels are first set with their zeros just in front of the brakes at the commencement of the day's work, and each key keeps an independent register of the number of its operations, so that at the end of the day's work the proprietor, on opening the case, can read off the wheels the totals of their operation. For instance, the five-cent key will show a register of twelve dollars and fifty cents on its two wheels, the ten-cent key will show a register of twenty dollars and forty cents, the fifteen-cent key a register of eighteen dollars and forty-five cents, and so on, the readings being taken from the numbers exposed just in front of the brakes. He jots down these different sums and adds them up, and so ascertains exactly the amount of cash that should be in the till. For very large establishments doing a very large business it might be desirable to have a third bank of wheels arranged behind the dollar-wheels and connected to them in the same manner as the other two banks, so that one entire revolution of a wheel of the second bank would turn the corresponding wheel of the third bank one notch. In such case the numbers on the third bank would be a progressive series of the highest number on the second bank—that is to say, taking the five-cent key as an example, its third wheel would be numbered 0, 20, 40, and so on.

As before stated, any suitable case to inclose the mechanism may be employed, and it should have a lid or cover, W, Fig. 1, securely locked, so that no one but the proprietor could open it to expose the registering-wheels; and the only exposed parts of the mechanism while the machine is in use are the operating ends of the keys and the tablets, which can be plainly seen through the glass of the opening in the top of the case.

Having thus fully described our invention, we claim—

1. In a registering and indicating machine, the combination, with a series of indicating-tablets operated by a series of keys, of a series of rods, each provided with a detent or shoulder and carrying

one of the aforesaid tablets, and a supporting-wing with connecting mechanism, whereby upon operating any one of the keys the wing is so moved as to permit the passage of the rod, and whereby upon the release of the keys the wing engages with and holds up the tablet-rod and tablet, substantially as described.

2. The keys E, pivoted upon a shaft, D, and provided with upwardly-extending arms S, carrying dogs T, in combination with the registering ratchet-wheels R, substantially as described.

154–160 3. The vertical tablet-rods F, arranged in guides, and having knuckles or elbows *d*, in combination with the keys E and wing I, substantially as described.

4. The wing I, in combination with the trip L, trigger *m*, link *p*, and arm J, substantially as and for the purpose specified.

5. The combination, with the bell M and trip *r*, with connecting mechanism, of the arms J, pivoted upon the shaft D, supported by the spring *q*, and connected by the bar K, arranged beneath the keys E, substantially as described, for the purpose specified.

JAMES RITTY.
JOHN BIRCH.

Witnesses:

F. DOEBLING.
B. W. EARLY.

(No Model.) 3 Sheets—Sheet 3

M. CAMPBELL,

CASH REGISTERING APPARATUS.

No. 253,506. Patented Feb. 14, 1882.

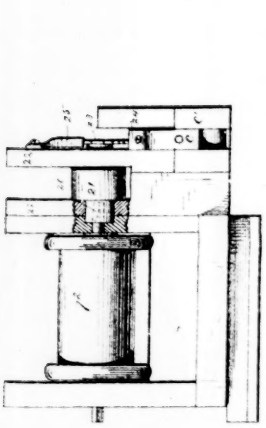


Fig. 10.

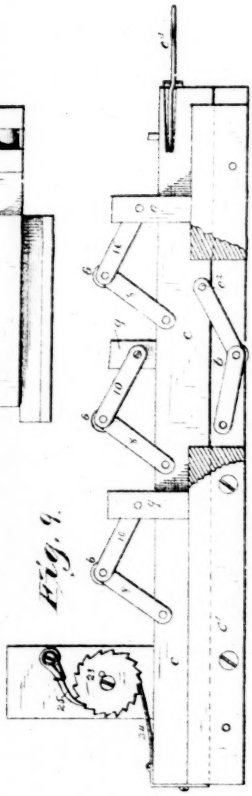


Fig. 9.

No. 155 Mott Cash Register Co. No. 1000

Boston, U.S.A. Mass.

Witnesses.

F. L. Emmond

Alex. Scott

Inventor:

Michael Campbell

Brady & Gregory, Attys.

by associate atty.

Wm. H. Sinclair.

(No Model.) 3 Sheets—Sheet 2.

M. CAMPBELL,

CASH REGISTERING APPARATUS.

No. 253,506 Patented Feb. 14, 1882.

Fig 3

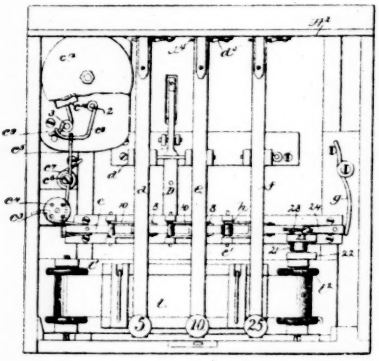
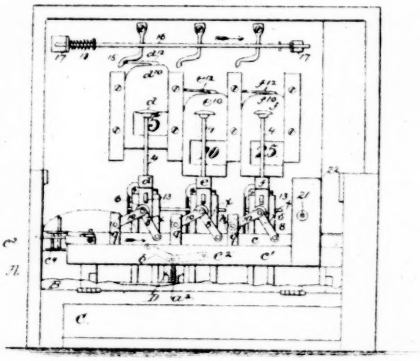


Fig 4



No. 155
Matt Bush Registers Co.
Boston, Mass. U.S.A.

Witnesses.
John F. C. Reinhart
L. F. Emery

Inventor.
Michael Campbell
by Crosby & Gregory.
Atty.

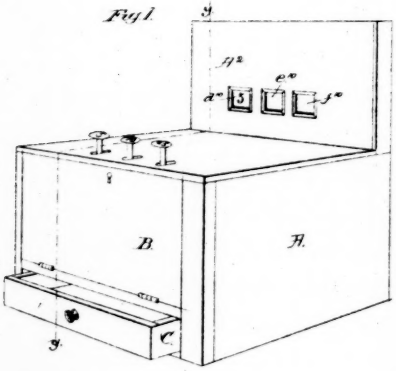
(No Model.) 3 Sheets—Sheet 1.

M. CAMPBELL,

CASH REGISTERING APPARATUS.

No. 253,506. Patented Feb. 14, 1882.

Fig 1.



No. 155.
Nat'l Cash Register Co
vs.
Patent & P. Rubber Stamp Co

Fig 6.



Fig 7.



Fig 2.

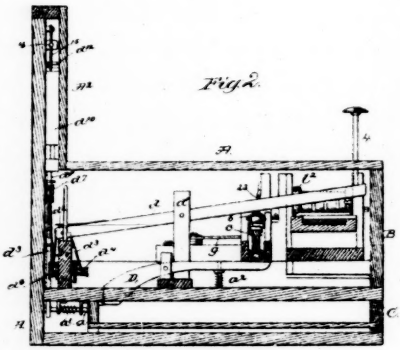


Fig 5.

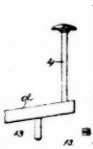
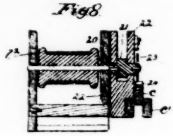


Fig 8.



Witnesses.
John F. C. Brinkhoff
L. F. Bonner

Inventor.
Michael Campbell
by Crosby Gregory Atty

161 UNITED STATES PATENT OFFICE.

MICHAEL CAMPBELL, of Boston, Massachusetts.

Cash-registering Apparatus.

Specification forming part of Letters Patent No. 253,506, dated February 14, 1882. Application filed August 1, 1881. (No model.)

To all whom it may concern:

Be it known that I, Michael Campbell, of Boston, county of Suffolk, and State of Massachusetts, have invented a new and useful improvement in cash-registering apparatus, of which the following description, in connection with the accompanying drawings, is a specification.

This invention relates to a cash-registering apparatus to be employed in connection with a cash-drawer, and is shown as embodied in a form suited for bar-room use, or where the amounts received at successive sales are usually fractional parts of a dollar, which are represented by a coin.

The object of my invention is to indicate visually, and also, if desired, upon a strip of paper, the amount of each sale.

I have arranged the keys or levers which are instrumental in moving the visual numbers, and embossing or marking the numbers on the strip of paper, so that they release the cash-drawer when a number is indicated, permitting a spring to open it; and as soon as the cash-drawer is shut it is again locked until another number is to be shown or marked, or both, a bell also sounding as the drawer is released and opened. These keys or levers will be arranged in series, and each key of each series will be adapted to operate a reel carrying a paper strip, and the simultaneous operation of several keys to indicate several numbers will only operate the said strip the same distance. Each key operates its own slide, having a visual number, and the slides and numbers made visual at one operation preparatory to opening the cash-drawer are simultaneously released and dropped out of sight as the numbered slides indicating the sale just made are being moved into position to be seen, to thus indicate the next amount of cash to be placed in the cash-drawer.

(Here follow diagrams marked pp. 156, 158, & 160.)

Figure 1 represents in perspective a cash-receiving apparatus embodying a sufficient portion of my invention to illustrate its operation, the cash-drawer being shown thrown open, as it will be automatically as the keys indicating the amount of cash to be put in the drawer are depressed. Fig. 2 is a vertical section on the dotted line *y y*, Fig. 1. Fig. 3 is a top view of the apparatus, the top casing being removed. Fig. 4 is a front end view, with the door B partially broken away and the carriage carrying the strip of paper

removed, the plate which partially conceals the visual numbers being also removed from Fig. 2; Fig. 5, a detail of the front end of one of the keys and its type; Fig. 6, a detail showing the ratchet-drum with which the end of the cord to be referred to is fixed; Fig. 7, a detail of the slide-rod operated by the key, and connecting-cord between them and the sheaves over which the said cord runs. Fig. 8 is a longitudinal sectional detail taken through the reel which receives the numbered strip of paper, and through the parts which rotate the said reel. Fig. 9 is a rear elevation, partly sectional, of the pawl-carrier on a larger scale, also showing the connections for operating the paper-reel. Fig. 10 is an end elevation, same scale, of the pawl-carrier and reel connected, the framing being partly broken away.

The case A, which receives the working parts of the apparatus to be described, has a locked door, B, and a drawer, C, acted upon by a drawer-opener, (shown in Fig. 2,) as a rod, a, surrounded by a spiral spring, a', the spring being compressed when the drawer is closed, as in said figure, where it is held closed by the drawer-holder, (shown as a lever, D,) the inner end of which acts upon the interior of the inner end of the drawer, the outer end of the said lever being held up by a spring, a^2, against a toggle-lever, b, (shown in dotted lines, Fig. 4,) one limb of which is connected with the pawl-carrier c, common to all the levers of the series of levers d e f, while its other limb is joined with a fixed bar, c', of the apparatus at c^2, this latter bar serving as a support and guide for the pawl-carrier. The toggle-lever b is bent or thrown down where its two limbs are joined together whenever the pawl-carrier c is moved in the direction of the arrow on it, Fig. 4, thus depressing the outer end of the drawer-holder D, lifting its inner end from the drawer and permitting the spring a' to throw the drawer open, as in Fig. 1, ready to receive a deposit of cash, and at the same time a pawl, c^3, carried by the pawl-carrier c, engages one of the bars of the lantern-wheel c^4, causing another bar of the said lantern-wheel to move the lever
162 c^5, pivoted at c^6, and held against the lantern-wheel by the spring c^7, the said lever c^5 being connected at its rear end with an arm, c^8, pivoted at 2, which arm c^8 is in turn loosely connected with the end of the striker-lever c^9, pivoted at 3, the striker c^{10} on the said lever striking the gong c^{12} each time the drawer is opened.

In the drawings I have shown but three keys or levers, d e f, but I desire to be understood that I may and intend in practice to use a greater number of like keys, each of which will indicate some particular amount of cash or dollars or tenths or hundredths of a dollar. As shown in the drawings, the lever d represents five, e ten, and f twenty-five cents. These levers, which I denominate "keys," have proper upright rods, 4, provided with buttons or heads, on which is designated the amount controlled by that lever or key, as represented in Fig. 1. Each key is alike in its mechanism and independent of the others in its action, so I need only describe key d and its connections. The key d has its outer end held up by resting on the roll 6 at the junction of a toggle-lever, x, composed of

links 8 10, the link 10 being joined to a standard, 9, of the bar c', while the link 8 is joined with the pawl-carrying bar c, before referred to, the normal condition of the said toggle-levers being elevated, as in Fig. 4, because of the pressure of the spring g (see Fig. 3) on the pawl-carrying bar c. Each key-lever has its fulcrum on a rod in a suitable standard, like d'. Each key d e f (see part of key d, Fig. 5) carries near its front end a type, 13, (shown in detail,) the lower end of which having on it a figure—in this instance the number 5—which is to be indicated by the key d.

The rear end of the key d has a pulley or roller, d^2, over which is extended a cord, d^3, one end of which is joined with the barrel of a ratchet, d^4, acted upon by a pawl, d^5, the said cord passed over the pulley d^2, as in Fig. 2; then passing down under a pulley, d^6, fixed on the cross-bar 14; thence up over a pulley, d^7, on a pin held in the frame A and thence down, where it is connected with, the rod d^8. The upper end of this rod d^8, when elevated, strikes and lifts the slide d^{10}, carrying the visual number 5, (see Figs. 1 and 4,) which number then shows through the opening made in the covering-plate A^2. The corresponding slide for the key e has on it the number 10, while the one for key f will be marked 25.

Each slide d^{10}, e^{10}, or f^{10} has a finger d^{12}, e^{12}, or f^{12}, which as a slide is lifted by the rod under it engages the hook 15 above it, the said hook holding the finger and keeping the slide elevated until such time as another slide at a subsequent operation of a lever is elevated, when it drops, because all the hooks 15, one for each slide, are extended through one common bar 16, (see Fig. 4,) pressed in the direction of the arrow thereon by the spring 18. The slide d^{10} is shown lifted and caught by one of the hooks 15. As one of the other slides is lifted to strike a hook 15, the hook then holding a slide up will release such slide, and it not being supported by a rod under it will drop.

The bar c will be moved to the right a certain fixed distance by depressing any one of the keys d, e, or f, and should two or more of the said keys be depressed the movement of the said bar c will not be altered, but each key would cause its slide to be lifted to show its proper visual number, and the type of each key would mark or impress its number on the roll or strip of paper l, which is gradually wound from the reel l' to the receiving-reel l^2, the shank 20 of which, extended and made square or of other irregular shape, (see Figs. 8 and 10,) is fitted into a corresponding-shaped opening in the rotating sleeve 21, held in standards 22, the said sleeve having a ratchet-wheel, 23, acted upon at each movement of slide c toward the left, Fig. 3, by a pawl, 24, a suitable detent-pawl, 25, preventing retrograde movement of the said ratchet and sleeve.

The slide d^{10}, &c., may be located in another apartment from that where the case and keys are placed, or at a considerable distance from the said keys, and through a system of cords and pulleys indicate to a party at a distance or in a separate office the amount of cash taken.

One of the toggle-levers x has a roller, h, to bear on and hold down the slide c.

I claim—

1. In a cash-registering apparatus, a series of keys provided with type designating certain amounts, a strip of paper to be marked by the said type, and a series of toggle-levers, *x*, one for each key, combined with a pawl-carrying bar common to all the said keys, and levers to operate the said strip of paper and move it intermittingly below the type of the said keys, substantially as described.

2. In a cash-registering apparatus, a series of keys to designate certain amounts, a pawl-carrying bar, *c*, and a series of toggle-levers, *x*, intermediate between each key and the said pawl-carrying bar, the toggle-lever *b*, actuated by the bar *c*, combined with the drawer-holder D and drawer C, substantially as described.

3. In a cash-registering apparatus, a series of keys to designate certain amounts, combined with the drawer, the drawer-holder D, mediately connected with said keys, and the spring to throw the drawer open when released by the drawer-holder, substantially as described.

4. In a cash-registering apparatus, a series of keys indicating certain amounts, and a series of slides indicating corresponding amounts, combined with bars connected with said keys by cords and pulleys to lift the slides when the keys are depressed, 163–170 and with a series of hooks and arms to retain the said slides in elevated position until the keys are again lifted, substantially as described.

5. The series of keys to correspond with numbers thereon, type carried by the said keys, a pawl-carrying slide common to all the said keys, a ratchet, and strip to be numbered by the said type, combined with a series of numbered slides, and intermediate devices, substantially as described, between the said keys and slides to operate them as the said keys are actuated to impress a figure or number on the said strip.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MICHAEL CAMPBELL.

Witnesses:

G. W. GREGORY.
B. J. NOYES.

3 Sheets—Sheet 3.

J. N. HARDY.

Fare Register.

No. 231,165. Patented Aug. 17, 1880.

Fig. 7.

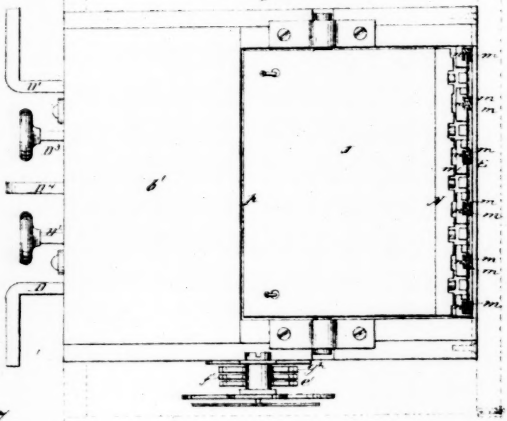
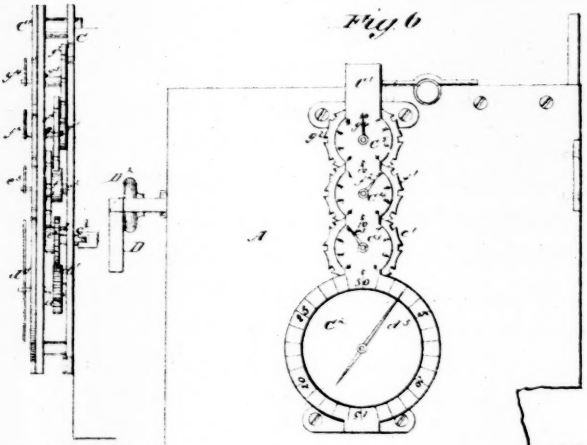


Fig 6



WITNESSES:

F. McArdle

C. Sedgwick

INVENTOR:

J. N. Hardy

BY Munn & Co.

ATTORNEYS.

3 Sheets—Sheet 1.

J. N. HARDY.

Fare Register.

No. 231,165. Patented Aug. 17, 1880.

Fig. 1.

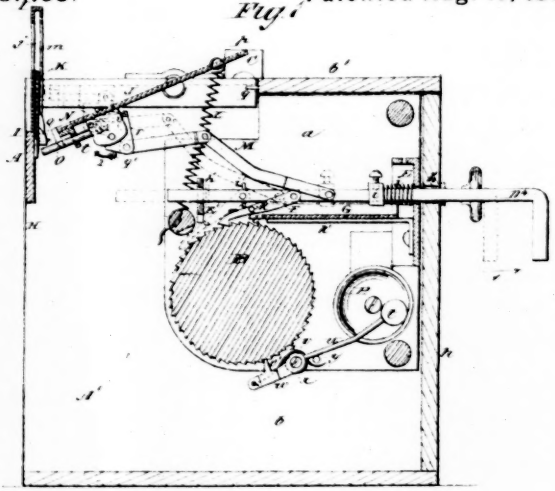
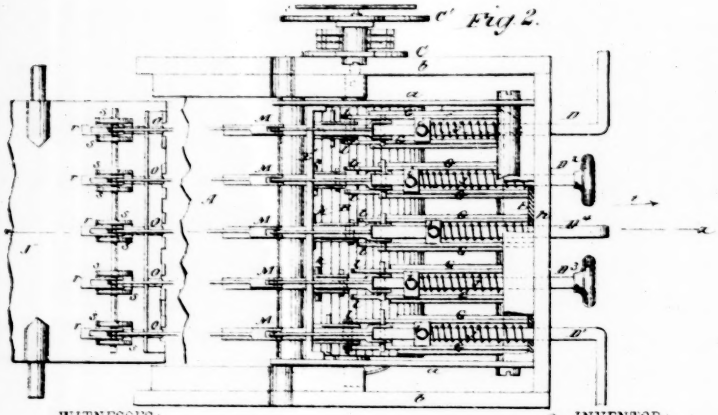


Fig. 2.



WITNESSES:

Frances McArdle

C. Dieguicon

INVENTOR:

J. N. Hardy

BY Munn & Co.

ATTORNEYS.

171 UNITED STATES PATENT OFFICE.

JOSEPH N. HARDY, of New Orleans, Louisiana.

Fare-register.

Specification forming part of Letters Patent No. 231,165, dated August 17, 1880. Application filed December 10, 1879.

To all whom it may concern:

Be it known that I, Joseph N. Hardy, of New Orleans, in the parish of Orleans and State of Louisiana, have invented a new and improved fare-register, of which the following is a specification.

The object of my invention is to furnish a register for registering the number of fares deposited in the fare-boxes used in street-railway cars, stages, and for other purposes.

The invention consists of a toothed cylinder pivoted in the lower part of the fare-box below the tilting trap. The shaft of this toothed cylinder is connected with an index on a circular dial, so that as the cylinder revolves it turns the index, which shows on the dial the number of fares paid.

The invention also consists in operating the cylinder by means of pawls connected with pulls having regularly-graduated movements, so that the cylinder can be moved different distances to register different numbers of single fares paid at a single time.

The invention also consists of mechanism connected with each of the several pulls, whereby, when one of the pulls is operated, a slide is thrown up which indicates the number of single fares paid.

(Here follow diagrams marked pp. 166, 168, & 170.)

In the accompanying drawings, figure 1 is a vertical longitudinal section of my improved register, taken on line *x x*, Fig. 2. Fig. 2 is a plan of the register with the top plates removed and exposing the interior arrangement of the operating mechanism. Fig. 3 represents the plate which carries the slides on which the fares are printed. Fig. 4 is an enlarged sectional view of the registering mechanism. Fig. 5 is a plan of the box containing the registering mechanism, also a sectional view, in dotted lines, of the case surrounding said box. Fig. 6 is a side elevation of the box containing the registering mechanism, showing the registering-dials; and Fig. 7 is a side elevation of the gearing by which the dials are operated.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, *A* is the lower part of the fare-box, in the space *A'* whereof is placed the iron box which receives the fares. In box *A*, on either side, are fixed metal plates *a a*, parallel to the sides *b b* of the box *A*.

B is a ratchet or toothed faced cylinder, placed transversely within box *A* behind the space *A'*. Said cylinder is provided at the

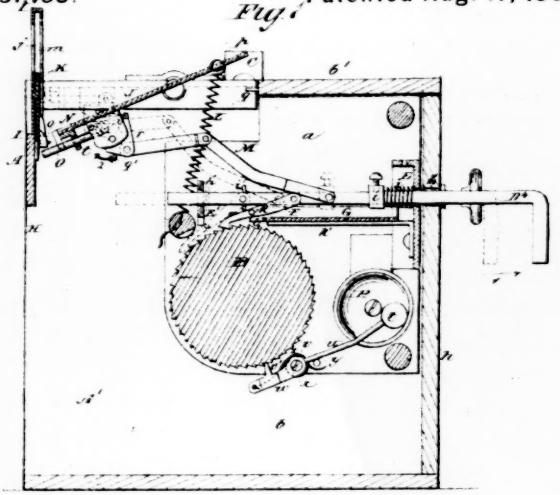
3 Sheets—Sheet 1.

J. N. HARDY.

Fare Register.

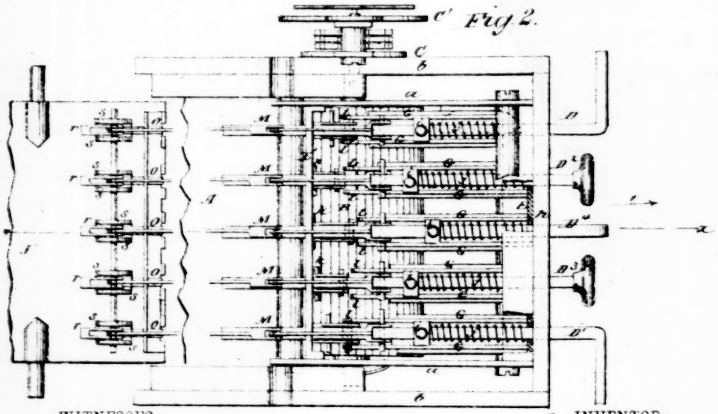
No. 231,165. Patented Aug. 17, 1880.

Fig. 1.



No. 155 Matt'd Cast Register Co } Fe 166
Boston. U.S.A. Co. Stall:

Fig 2.



WITNESSES:

Frances McArdle
C. Burgwick

INVENTOR:

J. N. Hardy
BY Munn & Co.
ATTORNEYS.

171 UNITED STATES PATENT OFFICE.

JOSEPH N. HARDY, of New Orleans, Louisiana.

Fare-register.

Specification forming part of Letters Patent No. 231,165, dated August 17, 1880. Application filed December 10, 1879.

To all whom it may concern:

Be it known that I, Joseph N. Hardy, of New Orleans, in the parish of Orleans and State of Louisiana, have invented a new and improved fare-register, of which the following is a specification.

The object of my invention is to furnish a register for registering the number of fares deposited in the fare-boxes used in street-railway cars, stages, and for other purposes.

The invention consists of a toothed cylinder pivoted in the lower part of the fare-box below the tilting trap. The shaft of this toothed cylinder is connected with an index on a circular dial, so that as the cylinder revolves it turns the index, which shows on the dial the number of fares paid.

The invention also consists in operating the cylinder by means of pawls connected with pulls having regularly-graduated movements, so that the cylinder can be moved different distances to register different numbers of single fares paid at a single time.

The invention also consists of mechanism connected with each of the several pulls, whereby, when one of the pulls is operated, a slide is thrown up which indicates the number of single fares paid.

(Here follow diagrams marked pp. 166, 168, & 170.)

In the accompanying drawings, figure 1 is a vertical longitudinal section of my improved register, taken on line *x x*, Fig. 2. Fig. 2 is a plan of the register with the top plates removed and exposing the interior arrangement of the operating mechanism. Fig. 3 represents the plate which carries the slides on which the fares are printed. Fig. 4 is an enlarged sectional view of the registering mechanism. Fig. 5 is a plan of the box containing the registering mechanism, also a sectional view, in dotted lines, of the case surrounding said box. Fig. 6 is a side elevation of the box containing the registering mechanism, showing the registering-dials; and Fig. 7 is a side elevation of the gearing by which the dials are operated.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A is the lower part of the fare-box, in the space A′ whereof is placed the iron box which receives the fares. In box A, on either side, are fixed metal plates *a a*, parallel to the sides *b b* of the box A.

B is a ratchet or toothed faced cylinder, placed transversely within box A behind the space A′. Said cylinder is provided at the

ends with short shafts c c', which are pivoted in plates a a. Shaft c is connected by a cross-pin to a shaft, c^2, that is journaled in vertical plates C C′ outside of the box, whereby the parts can be operated.

Between the plates C C′ shaft c^2 carries a pinion, d, which meshes with a spur-wheel, d', on shaft d^2, which projects through plate C′, and carries an index, d^3, which moves around a dial, C^2, on the lower part of plate C′.

On shaft c is another single-toothed wheel, e, which meshes with a mortised wheel, e', on shaft e^2. Shaft e^2 projects through a dial, C^3, and carries an index, e^3.

On shaft e^2 is a single-toothed wheel, f, which meshes with a mortised wheel, f', on shaft g, which projects through a dial, C^4, and carries an index, f^2.

On shaft g is a single-toothed wheel, g', which meshes with a mortised wheel, g^2, on shaft g^3, which projects through a dial, C^5, and carries an index, g^4.

The dials and indexes above mentioned register the movements of the mechanism, and their operation is as follows:

Index d^3 moves once around dial C^2 at every revolution of cylinder B. Index e^3 moves once around dial C^3 at every ten revolutions of index d^3. Index f^2 moves once around dial C^4 at every ten revolutions of index e^3, and in like manner index g^4 makes one revolution to every ten of index f^2.

D D′ D^2 D^3 D^4 are pulls, which are passed horizontally through the front plate, h, of box A, so as to slide freely back and forth on their bearings in slots h' in plates E E′, fixed transversely within box A above cylinder B.

On each of the pulls is a stop, i, and between stop i and plate E a spiral spring, j, is wrapped around the shaft of the pull. The stops i and springs j limit the distance to which the pulls can be drawn out in the direction of arrow 1, and the springs j serve to throw the pulls back by acting against the stops i. The
172 inward movement of the pulls is limited by the pins i' passed through the shafts of the pulls, which come in contact with the plate E′, and thus prevent the springs from forcing the pulls in too far.

To the shaft of each of the pulls, just over the cylinder B, is pivoted a spring-pawl, F, which is forced by the spring j', attached at one end to the said pawl and having its free end bearing against the shaft, down on the toothed face of cylinder B, so that said pawls F are held by said springs j' in position to engage the teeth of the cylinder B. Transversely through pawls F are passed pins k.

G G are fingers fixed to plates k', which project horizontally from plates E under the shafts of the pulls. A pair of these fingers, G G, is provided for each of the pulls, and the pawls F and the ends l l of said fingers project over the top of cylinder B, and the said ends l are rounded off in the manner shown in Figs. 1 and 4. The position of these fingers G is such that when the pulls are drawn back in the direction of arrow 1 the pawls F pass between the ends l l and the transverse pins k, striking against the rounded ends l l. The said ends pass under the pins k and throw the pawls up out of

contact with the face of cylinder B. As the cylinder B is revolved by the pawls F engaging the teeth of said cylinder when said pawls are drawn back in the direction of arrow 1, and as the cylinder B is intended to be moved different distances by the different pulls, the fingers G G are provided to limit the engagement of the pawls F with the teeth of cylinder B.

The number of teeth on cylinder B is intended to correspond precisely with the graduations on dial C^2, and each of the graduations on said dial indicates one fare, so that the pawls are arranged to turn the cylinder so as to move the index d^3 one step, two, three, four, and five, and upward, to any desired number, the number of fares it is possible to register at one time depending on the number of pulls and pawls employed. Thus pull D operates cylinder B through its pawl F, so as to move the index d^3 one step and register one fare. Pull D′ moves the index two steps and registers two fares. Pull D^2 moves the index three steps and registers three fares. Pull D^3 moves the index four steps and registers four fares, and pull D^4 moves the index five steps and registers five fares. This limitation of the movement of the index d^3 is brought about by the position which the ends *l l* of fingers G occupy relatively to the pawls F. Thus when pull D is drawn to register one fare the pawl F attached to the shaft of said pawl draws or revolves cylinder B sufficiently far to cause the said cylinder to move the index d^3 one step on the face of dial C^2. When the pawl has moved the cylinder sufficiently far for this purpose the transverse pin *k* of the pawl strikes the rounded ends *l* of the fingers, and the pawl is raised up out of connection with the tooth with which it was engaged, and the further movement of the cylinder B by the said pawl is prevented.

On releasing the pull D the spring throws it back, and the pawl F, connected to the shaft of said pull, is moved back the length of one tooth of the cylinder B. Thus by graduating the lengths of the fingers G G and the position of pins *k* the pawls are permitted to move the cylinder B sufficiently far to turn the index d^3 on dial C^2 one, two, three, four, and five steps, each indicating the same number of fares, respectively, for the pulls D D′ D^2 D^3 D^4, and when the pulls are released the pawls move back the number of teeth corresponding to the number of fares the respective pulls register. Thus the pawl connected with pull D moves back the length of one tooth of cylinder B, the pawl of pull D^2 moves back two teeth, the pawl of D^3 moves back three teeth, and the pawl D^4 moves back four teeth.

From this description it will be readily seen that by drawing the pull corresponding to the number of fares deposited in the fare-box at one time the pawl connected with the pull operates the cylinder B so that the index d^3 is moved the number of steps on the dial corresponding to the number of fares deposited.

To show to the passengers and others inside the car the number of fares deposited at one time and registered, and thus furnish means whereby it can be determined by the passengers or others whether the driver draws the right pull, I place in the side H of the fare-box that faces the inside of the car a metal plate, I, just in front of and at right angles to the tilting plate J when said plate is in a hori-

zontal closed position, as in Fig. 4. The part I′ of plate I extending above the level of the tilting plate J is provided with vertical slots or openings J′, and the sides of these slots are provided with vertical grooves *m m*, which extend some distance below the openings in J′. In grooves *m m* are held the edges of slides K, which are adapted to be thrown up in the openings J′ and to fall down behind plate I into the position they occupy in Figs. 1 and 3. When the slides are down they are supported by stops *n* fixed to the back of plate J. The slides are provided at their bottom edges at the back with lugs *o*. A slide, K, thus constructed and arranged is provided for each of the pulls D D′ D² D³ D⁴, and on the outside of the slides, in view of the passengers or others in the car, are printed or otherwise exhibited numbers corresponding respectively with the fares which the several pulls register. Thus the slide corresponding to pull D has "1" printed on it, slide corresponding to pull D′ has "2" printed upon it, and so on. One of these slides K is intended to be thrown up and held whenever the corresponding pull is drawn, and the manner of operating the said slides is as follows: The tilting plate J, on which the fares fall, is pivoted in the top of box A, between the top plate, *b′*, of said box and the
173 plate I. Said tilting plate turns freely on its pivots from the horizontal position it occupies in Fig. 4 to the inclined position it occupies in Fig. 1. When in a horizontal position the rear edge, *p*, of tilting plate J rests on stops *q* in the adjacent edge of top plate *b′*, where said edge is retained until tilted by the spiral springs L connected with said edge *p*. The springs L also serve to draw the tilting plate to a horizontal position after it has been tilted. The tilting plate J is intended to be tilted by each of the pulls D D′ D² D³ D⁴ independently of the others, and for this purpose the shaft of each of the pulls D, &c., is connected by a jointed connecting-rod, M, with one end, *q′*, of lever *r*, which is pivoted between jaws *s s* underneath the outer edge, N, of the tilting plate J. Now, when either one of the pulls D, &c., is drawn in the direction of the arrow 1 the connecting-rod M is drawn in the same direction, and said connecting-rod, acting through the lever *r*, draws the edge N of the tilting plate J down into the position it occupies in Fig. 1. The end *r′* of lever *r* opposite its end *q′*, which is pivoted to the connecting-rod M, is pivoted to the end of a bolt, O, which slides in an eye or guide, *t*, depending from the under side of the tilting plate J close to the edge N. By this connection of the levers *r* with the bolts O, when one of the pulls, D, &c., is pulled out in the direction of the arrow 1 the connecting-rod M, in addition to tilting the plate J, turns the lever *r* on its fulcrum, and thereby throws the bolt O out beyond the edge of tilting plate J into the position it occupies in Fig. 1. When the bolt O is in this manner thrown out, at the movement of the tilting of plate J the end of said bolt O passes under the lug *o* of the sliding plate K corresponding to the pull D, &c., drawn out, so that when the said pull is released and is forced back and the springs L recover the tilting plate J to its horizontal position, the bolt O, bearing against one lug *o* and the tilting plate catching the upper lug *o*, as the bolt withdraws, forces the slide K

up into its opening or slot J′, and the passengers or others in the car can see, by examining the figures on the slide so thrown up, whether the right pull was drawn to register the number of fares deposited in the box. After one slide K has been thrown up in the manner above described, and another fare is deposited in the box, as soon as one of the pulls D, &c., is pulled and the plate J is tilted, the slide K last thrown up drops down behind plate I, and the connecting-rod M and lever *r* corresponding to the pull drawn operate a bolt, O, connected with said lever *r*, and thereby throw up a slide corresponding to the pull drawn out. At the same time all the levers *r*, except the one connected with the pull drawn out, are turned on their fulcrums in jaws *s s* in the direction of the arrow 2, Fig. 1, by the tilting of plate J, and thereby the bolt O, which was thrust out before the tilting of plate J, is drawn in, and thereby said bolt and those not connected with the pull drawn out are prevented from throwing others of the slides K than the one which is intended to indicate the fare last paid.

It is also intended to indicate by the ringing of a bell the number of fares paid. For this purpose a gong-bell, P, is attached to one of the plates *a* behind the toothed cylinder B. The tapper *t* has its arm *u* pivoted at *v* to the plate *a*, and the end *w* of the arm beyond the pivot *v* is provided with a tooth, *x*′ which is held in contact with the toothed face of cylinder B by a spring, *x*, fixed at one end to the end *w* of the arm, while its free end is held under a stud, *y*. When the cylinder B is revolved the teeth bearing against the tooth *x*′ operate the arm so as to throw the tapper *t* against the gong P, and thereby sound said gong, and as every tooth of cylinder B represents a single fare it follows that when pull D is drawn, the cylinder being moved by the pawl F through the space of one tooth, the gong is sounded once, pull D′ sounds it twice, pull D^2 sounds it three times, pull D^3 sounds it four times, and pull D^4 sounds it five times. Thus it can be determined in two ways whether the car or stage driver registers the payment of the proper fare or fares by the slides K and by the sounding of the gong.

The apparatus above described is placed within the casing S (shown in dotted lines in Fig. 5) of the fare-box, so that the registering-dials C^2, &c., will be entirely concealed within the said casing. Access will be had to the said dials through a door, which will be kept locked, so that it can only be opened by the proper parties.

The pulls D, &c., project through the front of the car convenient to the driver, so that he can operate them from his position without trouble.

The fare is deposited in the upper part of the fare-box in the usual way, and it falls down on the tilting plate J, where the driver inspects it through a window in the casing of the fare-box to see if it is correct. Then he draws one of the pulls, D, &c., and tilts the plate J. The fare drops down into the iron draw, which is intended to be placed in A′, and simultaneously the cylinder is revolved, the number of fares paid at that one time is registered on dial C^2, the slide K is thrown up into view, and the gong is sounded.

This apparatus serves as a check both on the driver and "strip-

per," or the one who takes the fares from the fare-box at each trip, as the register is entirely concealed, and it is impossible for any one to know the amount registered without inspecting the dials C^2, &c., so that when the register is examined by the authorized parties the amount registered should correspond with the amount turned in by the stripper. If it does not so correspond, it is easy to fix the responsibility of the deficiency. The driver is checked by the watchfulness of the passengers or others in the car, as when fares
174–176 are paid the attention is attracted to the fact by the appearance of the slide K and also by the ringing of the gong.

Having thus described my invention, I claim as new and desire to secure by letters patent—

1. As an improvement in fare-registers, in combination, with the tilting plate J, the toothed cylinder B, pulls D, &c., connected with the tilting plate by suitable connecting-rods, spring-pawls F, index d^3, and dial C^2, as and for the purpose substantially as described.

2. In combination with the cylinder B and the pulls D, &c., and spring-pawls F, the fingers G, constructed and arranged substantially as described.

3. In combination with the cylinder B, pulls D, &c., connecting-rods M, levers r, tilting plate J, and bolts O, the slides K, constructed and operating in the manner substantially as described.

4. In combination with the cylinder B and the operating-pulls and spring-pawls, a series of registering-dials, C^2, C^3, &c., provided with suitable indexes, and the gearing connecting said indexes with the shaft of cylinder B, substantially as hereinbefore described.

JOSEPH NAPOLEON HARDY.

Witnesses:

CHAS. K. HALL.
W. R. RICHARDSON.

P. DEMING.

TYPE-WRITER.

No. 176,518. Patented April 25, 1876

No 155 Natl Cash Register Co
to
Boston E. & H.R. Co. et al } p. 176

Fig: 1.

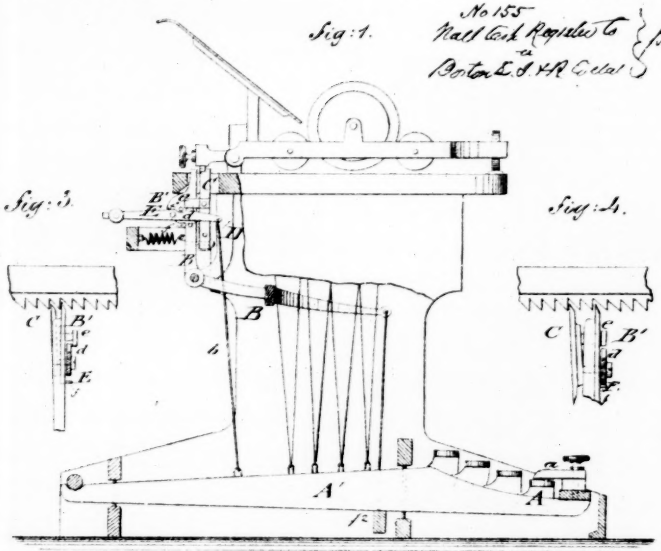
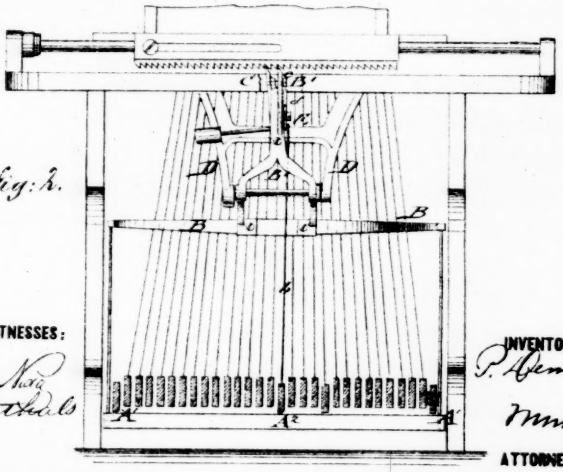


Fig: 3.

Fig: 4.

Fig: 2.



WITNESSES:

Chas Neary
J Goetschius

INVENTOR:

P. Deming

Munn & Co

ATTORNEYS.

177–180 UNITED STATES PATENT OFFICE.

PHILANDER DEMING, of Albany, New York.

Improvement in Type-writers.

Specification forming part of Letters Patent No. 176,518, dated April 25, 1876; application filed February 21, 1876.

To all whom it may concern:

Be it known that I, Philander Deming, of Albany, in the county of Albany and State of New York, have invented a new and improved type-writer, of which the following is a specification:

In the accompanying drawing, figure 1 represents a sectional side elevation of my improved type-writer, with my double escapement attached; Fig. 2, a rear view of the same; and Figs. 3 and 4 are detail side views of the double escapement, showing it in position as feeding one and two teeth.

(Here follows diagram marked p. 176.)

Similar letters of reference indicate corresponding parts.

The object of my invention is to so improve the well-known type-writers that they may be made available in effective manner for short-hand reporting, and also the speed of the same in copying common writing be considerably increased.

The invention consists of a double escapement in connection with the rack-bar of the carriage of the printing-cylinder, the escapement being operated by an anvil and key, that may be brought in connection with the space-key.

In the drawing, A represents the key and key-lever of my double escapement, which may be coupled by a pivoted button, *a*, to the space-key A^1, if desired. In most cases it is advantageous to couple the space-bar to the escapement-key A, as the former may be more conveniently reached and depressed jointly with any other key of the key-board.

The keys of the key-board and the space-key connect, by the usual cross-bar A^2, with the front end of a spring-acted elbow-lever, B, that is fulcrumed to a stationary arm or bracket, D, operating, by its bifurcated upward-extending arm B′, the rack-bar of the carriage of the printing-roller.

An anvil, E, is fulcrumed to the upper arm B′ of the elbow-lever B, being connected at its inner or front end by a pivoted wire rod, *b*, to the key-lever A, and weighted at the outer or rear end, to carry the front end up again as soon as the key is released. The swinging motion of the anvil E is defined by stop-pins *f* above and below the inner arm of the same.

The anvil E has an upward-extending lug, *d*, that engages the stop *e* of the swinging and weighted escapement-lever C, which admits the printing-cylinder to advance one tooth, when disengaged

from the rack-bar by the depression of a key, so as to produce the forward feeding of the cylinder-carriage, tooth for tooth, in the usual manner; but when the escapement-key A is depressed the lug *d* releases the stop *e*, and permits the swinging over of the weighted escapement-lever C to double the width from the lever B, so as to allow the feeding forward of the rack-bar for the space of two teeth. When, therefore, the escapement-key is depressed simultaneously with a common key, or with the space-key, the forward feeding of the printing-cylinder to twice the common distance at the depression of a single key is obtained, and thereby the means furnished to produce the spacing simultaneously with the depression of the key of the terminal letter of a word, without requiring the depression of the letter-key and space-bar in consecutive order. This saves the time hitherto taken up by the separate depression of the space-key, and increases not only the regular copying speed of the type-writer, but also adapts the same, in a very simple and reliable manner, for stenotypic purposes.

Having thus described my invention, I claim as new and desire to secure by letters patent—

1. The combination, with the escape feed mechanism, of the additional escape feed mechanism, that produces the double escapement of the feed when its key is depressed, and allows of simultaneous working with a common key, substantially as and for the purpose described.

2. A weighted anvil fulcrumed to the upper arm of the escape-lever, and operated by a separate key and key-lever, in combination with the swinging and weighted escapement-lever of the feed mechanism of the type-writer, to admit single or double escapement of feed mechanism of printing-cylinder, as required, substantially in the manner described.

3. The combination of anvil E, having the lug *d*, and fulcrumed to upper arm of lever B, connected, by pivoted wire *b*, with the key-lever A, and weighted at rear end with the swinging and weighted escapement-lever C, having stop *e*, substantially as and for the purpose specified.

PHILANDER DEMING.

Witnesses:
JOHN D. CAPRON.
JOHN HOMIGAN.

C. L. SHOLES & C. GLIDDEN.
Type-Writing Machine.

No. 200,351. Patented Feb. 12, 1878.

Fig. 1.

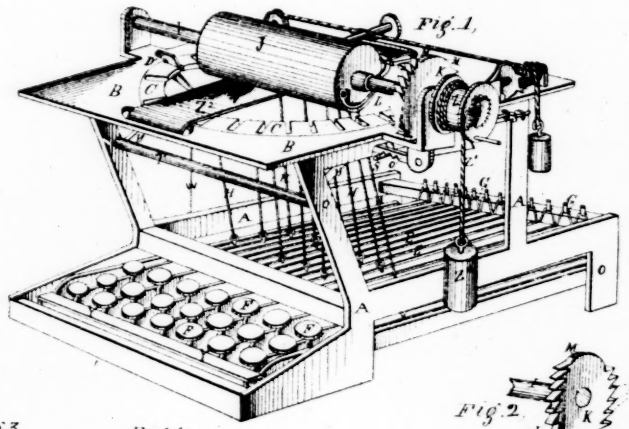


Fig. 3.

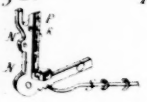


Fig. 4.



Fig. 2.

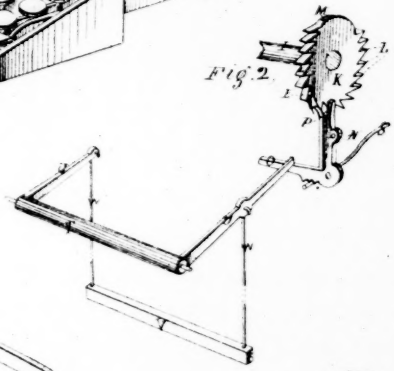
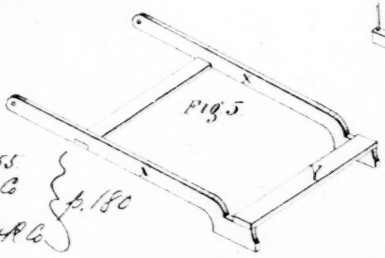


Fig. 5.

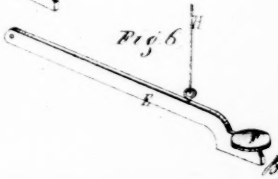


No. 155.
M. C. R. C.
to
B. C. & R. C.
p. 180

Fig. 7.



Fig. 6.



Witnesses
H. C. Edelen
E. E. Mason

Inventors
C. Latham Sholes.
Carlos Glidden.
By James Dennison Atty.

181 UNITED STATES PATENT OFFICE.

C. LATHAM SHOLES and CARLOS GLIDDEN, of Milwaukee, Wisconsin, assignors, by mesne assignments, to the Type Writer Company.

Improvement in Type-writing Machines.

Specification forming part of Letters Patent No. 200,351, dated February 12, 1878; application filed January 16, 1874.

To all whom it may concern:

Be it known that we, C. Latham Sholes and Carlos Glidden, of Milwaukee, Wisconsin, have invented improvements in type-writing machines, of which the following is a specification:

The nature of the invention is as follows: In combining two ratchets, attached together side by side, pointed practically in the same direction, and pivoted so they may vibrate in the same plane in one direction, but one pivoted separately, so it may vibrate independently in a plane at a right angle to that of the joint vibration, so they may vibrate in parallel planes in the reverse direction, with only one series of ratchet-teeth and notches, and with the key-levers, vibratory frame, paper-carriage, and platen of a type-writing machine; and in combining a horizontal bar, attached and pivoted so it may vibrate across in front of the key-levers, with the vibratory frame and letter-space ratchets of a type-writing machine.

The accompanying drawing and following description fully illustrate the invention.

(Here follows diagram marked p. 180.)

The figures of the drawing represent views as follows: Figure 1, a view of a type-writing machine; Fig. 2, a view of the vibratory frame and letter-space ratchets and a series of ratchet-teeth and notches; Figs. 3 and 4, views of the letter-space ratchets; Fig. 5, a view of the space-key frame; Fig. 6, a view of a key-lever; and Fig. 7, a view of a type-bar.

The description is as follows: A represents the side plates of the main frame of a type-writing machine; B, the top plate on the side plates A; C, a slotted annular disk within an aperture in the top plate B; D, a type-bar pivoted in each radial slot of the annular disk C; E, a series of levers pivoted near the bottom, at the back part, and extended through to the front part of the main frame A B; F, a key on the front end of each pivoted lever E; G, a spring attached to each key-lever F E, and to a cross-bar above attached to the side plates A; H, a connecting-wire or ligament attached to the other end of each type-bar D, and to a corresponding key-lever, F E, below; I, a long shaft or main axle across over the middle of the annular disk C, in bearing-arms attached to the top plate B; J, a cylindrical platen on and attached so it may both turn with and slide along over the main axle I; K, a circular plate on near the

end of the main axle I; L, a series of teeth, similar to saw-teeth, on the periphery of the circular plate K; M, a wide space, without any teeth, on the periphery of the circular plate K; N, a ratchet under the circular plate or ratchet-wheel K L, and pivoted so it may vibrate in a plane parallel with the longitudinal line of the main axle I, and work into and out from the notches of the ratchet-wheel K L; O, an arm attached to the vibratory ratchet N, and extended to and within the main frame A B; P, another ratchet attached to the first ratchet N, pointed practically in the same direction, and pivoted so they may vibrate in the same plane and work in the same notch of the ratchet-wheel K L, but one pivoted on a separate axis, so it may vibrate independently in a plane at a right angle to that of the joint vibration; Q, a weight or weighted end attached, below the pivot, to the second ratchet P; R, a stop attached, above the pivot, to the second ratchet P, so it may strike and stop against the first ratchet N; S, a lifting-spring attached to the side plate A, and extended under the ratchet-arm O; T, a bar attached and pivoted to and within the main frame A B, in line across over the key-levers F E; U, an arm attached to each end of the pivoted cross-bar T, and extended inwardly so they may vibrate in vertical planes parallel with the longitudinal lines of the key-levers F E, and one extended over, so as to rest on the ratchet arm O; V, a bar across, under and up against the key-levers F E; W, a connecting-wire or ligament attached to each end of the under cross-bar V, and to the corresponding vibratory arm U above; X, a lever similar to and at each side of the series of key-levers F E, and in like manner pivoted at the rear, and extended through to the front, over the pendent cross-bar V; Y, a horizontal bar attached to the fore end of each side lever X, across in front of the key-levers F E; Z, a pulley attached to the end of the main axle I, and loose and adapted to turn on the axle in one direction, but to engage and turn the axle in the reverse direction; Z′, a cord attached by one
182–186 end to the pulley Z; Z″, a weight, attached to the other end of the cord Z′; and Z^2, an inking-ribbon attached to the ribbon-spools within the main frame A B, and extended up through the top plate B, and across over the middle of the annular disk C, under the platen J.

The operation is as follows: The depression of any key-lever F E will vibrate the type-bar D, and throw the type thereof up against the inking-ribbon Z^2 and platen J, and make an impression on the paper which is wrapped around the platen. At the same time the key-lever will depress the vibratory frame T U V W, which will depress the ratchet-arm O and vibrate the ratchets N P, and draw the doubly-pivoted ratchet P out of, and the singly-pivoted ratchet N into, the same ratchet-notch L, which will hold the ratchet-wheel K L, main axle I, and platen J from turning and the paper from moving while the type makes the impression; and at the same time, also, the weight or weighted end Q will vibrate the doubly-pivoted ratchet P thus drawn from the ratchet-notch L a notch-space distance in parallel reverse direction of the movement of the ratchet-wheel K L. The release of the key-lever F E will

allow the lever-spring G to lift the lever to place, and allow the lifting-spring S to lift the ratchet-arm O and vibratory frame T U V W to place, and to vibrate the ratchets N P in the reverse direction, and thrust the singly-pivoted ratchet N out of its ratchet-notch, and thrust the doubly-pivoted ratchet P into the next notch back. At the same time, practically, the driving-weight Z'' will turn the main axle I, platen J, and ratchet-wheel K L, and move the paper a notch-space or letter-space distance, and vibrate the doubly-pivoted ratchet P in the direction of the movement of the ratchet-wheel till the stop R strikes against the singly-pivoted ratchet N, which stops all movement, and brings the ratchets again in normal position, ready for another operation. The singly-pivoted ratchet N does not vibrate in the direction of the movement of the ratchet-wheel, and holds the wheel and platen and paper from moving, and is therefore called the "stiff ratchet," but the doubly-pivoted ratchet P does vibrate in that direction, and allows the wheel and platen and paper to move, and is therefore called the "limber ratchet." The depression of the horizontal bar Y at either end, or any point between, will depress one or the other or both of the side levers X, which will depress the vibratory frame T U V W, and work the letter-space ratchets N P, and move the platen and paper without vibrating a type and making an impression; and it is therefore called a "space-key."

The combination of the driving-power Z'' and two parallel series of ratchet-teeth and notches, similar to the ratchet-teeth and notches L attached to the paper carriage or platen J, with two vibratory ratchets similar to the ratchets N P, but each attached to a separate end of a straight or bifurcated walking-beam, and with the key-levers F E and vibratory frame T U V W, to produce and regulate the intermittent letter-space movement of a type-writing machine, is a well-known device. So, also, a space-key similar to one of the key-levers F E, for working the vibratory frame and securing such intermittent movement, is a device common and well known; but the improvements which constitute this invention are as follows: First, the attachment of the two ratchets N P directly together, side by side, pointed practically in the same direction, and pivoted so they may vibrate in the same plane in one direction and enter the same ratchet-notch L, but one pivoted on another and separate axis, so it may vibrate independently in a plane at a right angle to that of the joint vibration, so they may vibrate in parallel planes in the reverse direction, and one enter the next notch back, renders unnecessary the walking-beam and second series of ratchet teeth and notches referred to, and gives a simpler and cheaper and equally efficient device; second, the attachment of the horizontal bar Y across in front of and next to the key-levers F E to the two side levers X makes a space-key as long as the key-board is wide, and directly under and convenient to any finger of either hand; therefore,

What we claim is as follows:

1. The combination of two ratchets, attached together side by side, pointed practically in the same direction, and pivoted so they

may vibrate in the same plane in one direction, but one pivoted separately, so it may vibrate independently in a plane at a right angle to that of the joint vibration, so they may vibrate in parallel planes in the reverse direction, with only one series of ratchet-teeth and notches, and with the key-levers, vibratory frame, paper-carriage, and platen of a type-writting machine, substantially as described.

2. The combination of a horizontal bar, attached and pivoted so it may vibrate across in front of the key-levers, with the vibratory frame and letter-space ratchets of a type-writing machine, substantially as described.

C. LATHAM SHOLES.
CARLOS GLIDDEN.

Witnesses:
H. W. SEYMOUR.
D. J. PAUL.

2 Sheets—Sheet 2

R. T. P. ALLEN.

TYPE-WRITERS.

No. 185,714. Patented Dec. 26, 1876.

Fig. 3.

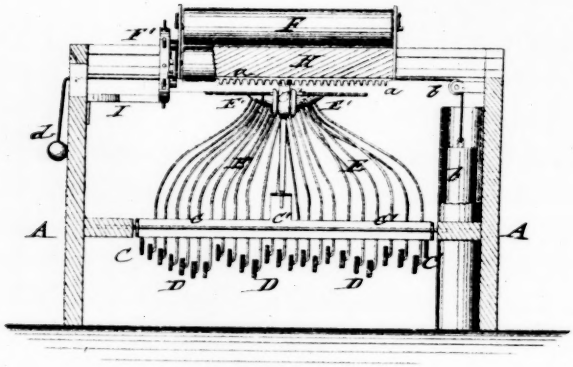


Fig. 4.

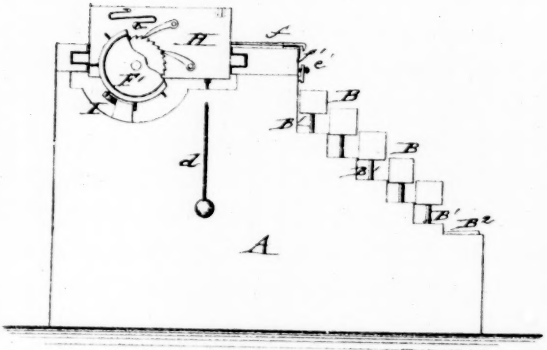
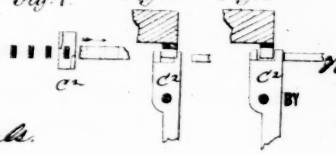


Fig. 7 Fig. 5. Fig. 6.



WITNESSES:

Chas. Nott
John Cochrane

INVENTOR:

R. T. P. Allen

BY

Munn & Co

ATTORNEYS

2 Sheets—Sheet 1.

R. T. P. ALLEN.

TYPE-WRITERS.

No. 185,714. Patented Dec. 26, 1876.

Fig: 1.

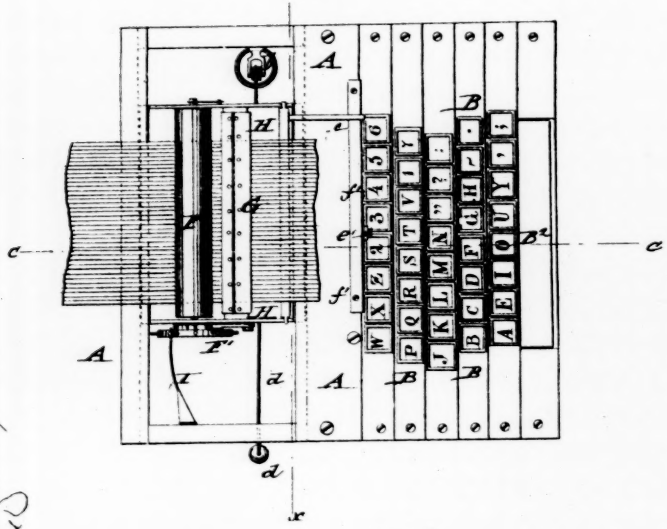
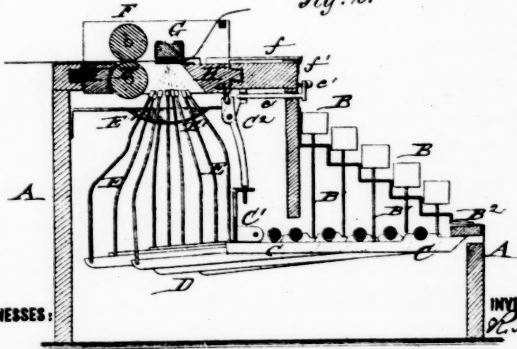


Fig: 2.



WITNESSES:

INVENTOR:
R. T. P. Allen.

BY

ATTORNEYS.

187 UNITED STATES PATENT OFFICE.

ROBERT T. P. ALLEN, of Farmdale, Kentucky.

Improvement in Type-writers.

Specification forming part of Letters Patent No. 185,714, dated December 26, 1876; application filed April 25, 1876.

To all whom it may concern:

Be it known that I, Robert T. P. Allen, of Farmdale, county of Franklin, and State of Kentucky, have invented a new and improved type-writing machine, of which the following is a specification:

(Here follows diagram marked pp. 184 & 186.)

In the accompanying drawings, figure 1 represents a top view of my improved type-writing machine. Figs. 2 and 3 are vertical longitudinal and transverse sections, respectively, on the lines *c c* and *x x*, Fig. 1. Fig. 4 is a side elevation of the machine, showing mechanism for feeding paper; and Figs. 5, 6, and 7 are detail side and top views of the double pawl governing the motion of the carriage.

Similar letters of reference indicate corresponding parts.

My invention relates to certain improvements to type-writing machines, by which the carriage is moved back for a new line in a simple manner, and the paper fed forward for the action of the types simultaneously therewith by suitable mechanism; and the invention consists in the arrangement of types striking a common center, and connected by curved type-rods and levers with suitably-disposed keys, governing, by means of a double pawl that is operated by each depression of a key, the motion of the sliding and weighted carriage that is arranged with the printing-ribbon, platen, and paper-feeding mechanism. The carriage is moved backward to one side by a button and cord, simultaneously with the release of the double pawl by a suitable key, and feeds the paper forward for the next line by means of a spur-wheel and stationary set-spring.

In the drawing, A represents a casing or frame of suitable size, that supports the different working parts of my improved type-writing machine. At the upper or top part is arranged the movable carriage and paper-feeding mechanism, while in front of the same are disposed, in suitable manner, but preferably in step-shaped manner, as shown in Figs. 1 and 2, the keys B, arranged according to frequency and convenience of use, and provided with the letters of the alphabet, numerals, and the most common punctuation-signs. The keys B are connected by downward descending wire rods B^1 with a corresponding number of parallel levers, D, that are fulcrumed to cross-pivots of the frame, and extended backward, carrying at their rear ends the curved type-rods E, which are curved in

upward and inward direction toward a common center, being guided by suitable guide-plates E', and provided with types that correspond to the character of their keys. The types are so arranged at the ends of their curved and radiating rods E that when the keys are depressed they are separately thrown up against a common center or printing-point, striking a coloring ribbon and printing on the paper, that is retained by a platen, G, in the manner of the well-known type-writing machines in use.

For the purpose of spacing the words, a space key or bar, B^2, is arranged at the lowermost step of the frame A, and connected by outer levers C with a lateraly vibrating bar, C^1, that is pivoted, by suitable lever-arms, to the sides of frame A. The vibrating bar C^1 carries on a central support the lower part of a fulcrumed and spring-acted double pawl, C^2, that engages a toothed bar or back, *a*, of a carriage, H, that slides laterally in suitable ways or guides at the table or top part of the machine. The carriage H is moved in one direction by means of a cord, pulley, and weight, *b*, which latter slides in a suitable casing at the inside of frame A, as shown in Figs. 1 and 3, and in the other direction by a cord and button, *d*, the weight serving, in connection with the double pawl, to move the paper laterally with each marking of a type, and carry it into position for the printing action of the next key, while the button serves to bring the carriage and paper back to admit the forward feeding of the paper for the next line by a suitable mechanism.

As the type-operating levers are arranged to pass below the vibrating pawl-operating bar, the depression of each key produces the action of the double pawl, so that one of its lugs releases one of the cogs on the cog-bar, and admits, by the action of the weight, the forward motion of the carriage to a distance equal to the space between the cogs of the rack, the second lug of the same arresting instantly the motion of the carriage by engaging the next tooth of the rack, as illustrated clearly in Figs. 5, 6, and 7. The
188–192 paper is thereby fed forward for the space of a letter, and so on until the line is completed. The spaces between the words are formed in the same manner by the depression of the space-bar. When the line is completed the carriage is drawn back, to begin a new line, by the button, the double pawl C^2 being withdrawn at the same time to admit the free movement of the carriage, by pressing a sliding rod, *e*, with button *e'* arranged at the center of the box, against the upper end of the pawl. When the carriage has arrived at the starting point of the case or frame, the pawl-governing rod is released for the printing of the next line. The paper is fed forward for the space required between the lines by means of two feed-rollers, F, of which one is placed above, the other below, the plane of the paper, they being journaled to suitable supports of the carriage. The paper passes from a top guide bar or roller of the carriage, between the plates and coloring ribbon, and between the feed-rollers, to the rear of the case, the rollers being pressed together to take hold of and retain the paper by suitable springs attached to the ends of their shafts. The shaft of the lower roller is provided with a ratchet-wheel and check-pawl, to prevent

the rollers and paper from being moved in backward direction. The shaft of the lower roller F is also provided at the end toward the operating-button of the carriage with a spur-wheel, F′, whose radially-extending and equidistant spurs or spokes are engaged by the free end of a band-spring, I, that is affixed at one end to the frame of the machine, and so twisted or shaped that it presses against one of the spokes when the carriage is drawn back, turning thereby the spur-wheel and the feed-rollers to the distance required between the lines.

The feed-roller-actuating spring may be further arranged to strike a bell when releasing the adjoining spur of the wheel, so as to indicate the approaching of the carriage to the end of the line, and notify the operator to prepare for the drawing back of the carriage. The spring bears during the forward motion of the carriage on the next spur, and is brought on the release of the same, and the drawing back of the carriage, over to the other side of the same spur, so as to produce, by the drawing back of the carriage, the forward feeding of the paper simultaneously with the motion of the carriage.

The carriage H is further provided with an indicating finger or indicator, *f*, that runs along a graduated scale, *f′*, along the front part of the case, so that the operator can see at any time the distance to which the line is printed, and when the line is completed.

The type-writer may be brought by the simple arrangement of the devices for moving the carriage and feeding the paper, into handy and compact shape, to be placed on any table or desk for ready and convenient use.

Having thus described my invention, I claim as new and desire to secure by letters patent—

1. In a type-writing machine, the combination of the curved converging rods bearing types on their upper ends with levers, whose other extremities are connected with lettered keys, as shown in the drawings herewith.

2. In a type-writing machine, the combination of the sliding paper carriage, rock-bar, double-govering pawl, its sliding releasing-rod, feed-rollers, spur-wheel, check-ratchet, and twisted spring, with curved converging type bearing rods and levers, the whole arranged to operate substantially as and for the purposes set forth.

In testimony whereof I have hereunto set my hand this 10th day of April, 1876.

R. T. P. ALLEN.

Witnesses:
E. S. THEOBALD.
A. W. OVERTON.

193 UNITED STATES PATENT OFFICE.

JACOB CAPRON, of New York, N. Y.

Improvement in Annunciators.

Specification forming part of Letters Patent No. 110,547, dated December 27, 1870.

To all whom it may concern:

Be it known that I, Jacob Capron, of New York, in the county of New York and State of New York, have invented new and useful improvements in annunciators; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention relates to improvements in annunciators of the class known as the "Jackson annunciator;" and it consists in certain details of construction which will be fully described hereinafter.

(Here follow diagrams marked pp. 190 & 192.)

In the drawings, figure 1, sheet 1, represents a rear view of the foundation-plate with the various operating parts in place. Fig. 2, sheet 2, is a plan view of the swinging rack. Fig. 3 represents the face-plates and the crank on the rear of the foundation-plate, which moves the slide returning the tumblers.

The main features shown in the drawings are of the construction known commonly as the "Jackson annunciator," and need not be particularly described.

On the face of the foundation-plate A are the usual numbers forming the register, covered by the face-plates B B, slightly heavier on one side, and connected to the tumblers C C by pins or bolts passing through the foundation-plate.

Fixed to the rear of the foundation-plate at proper distance above the pivots of the tumblers are guides D D, in which move sliding stops *a a*. These stops are connected on the one side to springs *a' a'* and on the other to crank-levers *b b*. They are arranged at such points with relation to the tumblers that when drawn back by the retraction of the spring they will hold the tumblers in the position shown in the figure, and consequently the face-plate elevated and covering the numbers on the register; but when these stops are drawn away from the arms of the tumblers the weight of the face-plates, being greater on that side next the sliding stops, carries the tumblers with the face-plates, in the direction of the motion of the stops to an inverted position, thus leaving the number beneath the said face-plate in each instance exposed to view.

It will be especially observed that the stops are not in any way connected to the tumblers, which move freely when the stops are drawn away. Any convenient number of these may be arranged in the same horizontal line. The tumblers C C are of peculiar construction, having two arms, *d* and *e*, and a point, *g*. The arm *e* is made straight and rests against the stop. The other arm and

2 Sheets—Sheet 1.

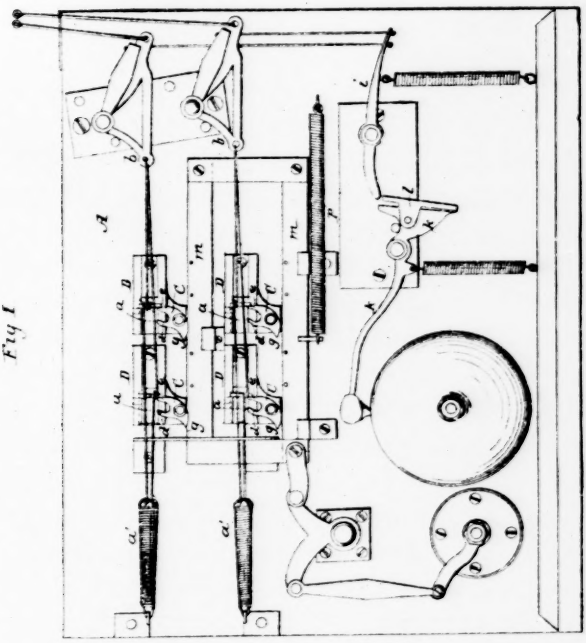
J. CAPRON.

Annunciator.

No. 110,547. Patented Dec. 27, 1870

No 155
M.C.R. Co
B.C.&A.R. Co et al
} p. 190

Fig 1



Witnesses
J. J. Noyes
E. A. Nelson

Inventor
Jacob Capron by
Wm Endell atty

point serve purposes which will be hereinafter described. These sliding stops are operated through the crank-levers *b b*, as before stated, by means of ordinary connections. The crank-levers are hung on the same pivot, in number equaling the number of figures on the register and corresponding face-plates. Each has its own separate wire, carried, as usual, to its proper apartment. Over these levers thus hung on one pivot is a rack (shown in Fig. 2) swinging on the same pivot. Its transverse bar *h* rests across the levers in such a manner that the elevation of any lever of the set raises the rack.

From the bar *h* a wire runs to the lever *i*, through which the hammer is operated. It will thus be evident that the raising of any one of the levers, causing the disclosure of a given number, will cause the bell to be struck, while at the same time only one wire is used to connect the bell-lever to the rack. Separate wires may be run to other racks located above.

The lever K, which carries the hammer, is pivoted, as shown, and provided with spring, as usual. Its rear end is enlarged, as shown at K′, and has a swinging face, *l*, pivoted by suitable arms therein, and so made and hung as to fall by gravity to the position shown in the drawings. When in this position the end of the lever *i* hangs directly above its upper end. When, however, the other end of this lever is raised by the wire connected thereto, the depressed end strikes the face *l* and carries down with it the enlarged end of the lever, thus raising the hammer. At a proper point, the hammer being raised, the face-piece swings and slips from the end of *i*′, allowing the latter to return with itself to the original positions and permitting the hammer to strike freely. The upper part of the enlarged end is slightly cut out and rests against a stop. The tumblers, or any one of them separately, are returned to their proper position, covering with the face-plate the number by means of the sliding frame *m*, which carries pins suitably arranged
194–198 to strike, when the frame is drawn to the left, successively upon the bent arm *d* and the point *g*.

The frame is moved by suitable crank and connections, and is drawn back by a spring, *n*.

All the parts are properly fixed and connected to the foundation-plate and the number of face-plates and connections suited to the requirements of the case.

The marked difference between the Jackson annunciator and my improvement is that in the former the stops operate directly upon the face-plate, while in mine they operate upon the tumbler itself without the interposition of a bell-crank.

Having thus fully described my improvements, what I claim as new, and desire to secure by letters patent of the United States, is—

The stops *a*, acting directly upon the tumblers, combined with the rotating face-plates, as shown and described.

This specification signed and witnessed this 27th day of May, 1870.

JACOB CAPRON.

Witnesses:

THOS. BARKER.

W. M. POWELL.

199 UNITED STATES PATENT OFFICE.

FAWCETT PLUMB, of Streator, Illinois.

Adding-machine.

Specification forming part of Letters Patent No. 256,591, dated April 18, 1882. Application filed June 17, 1881. (Model.)

To all whom it may concern:

Be it known that I, Fawcett Plumb, of Streator, in the county of La Salle and State of Illinois, have invented certain new and useful improvements in adding-instruments; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in adding-instruments or arithmometers, the object being to provide a device of this character combining simplicity of construction and accuracy of operation, and requiring but little skill in its manipulation.

The principle upon which the device is constructed consists in the revolution of a disk peripherally encircled by a series of numbers running from 0 to 99 through arcs of circles embracing from one to nine numbers by means of nine keys transmitting motion through a system of suitably-arranged levers.

With the objects of invention above given in view, my invention comprehends the practical application of this principle; and it consists in certain details of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

(Here follow diagrams marked pp. 196 & 198.)

In the accompanying drawings, figure 1 is a view in perspective of a device constructed in accordance with my invention. Fig. 2 is a plan view thereof, the top of the case being removed and one key being depressed. Fig. 3 is a view, in vertical cross-section, showing the operating-levers; and Fig. 4 is a similar view representing the mechanism of the hundreds-wheel.

A represents a case adapted to inclose the working parts of the instruments. It is provided with a removable convex cover, B, which is perforated to expose a small section of the peripheries of the units and tens wheel C and the hundreds-wheel D. Pointers E and F, attached to the said cover, designate the numbers on the wheels C and D respectively. The units and tens wheel C is mounted on a shaft, G, which longitudinally traverses the case A, being journaled in each end thereof. The said shaft G also supports wheel H, the peripheral face of which is provided with exactly one hundred cog-teeth, and forms the fulcrum of the levers I of the different keys J, which severally represent the numbers from 1 to 9,

(Model.) 2 Sheets—Sheet 1.

F. PLUMB.

ADDING MACHINE.

No. 256,591. Patented Apr. 18, 1882.

Fig. 1.

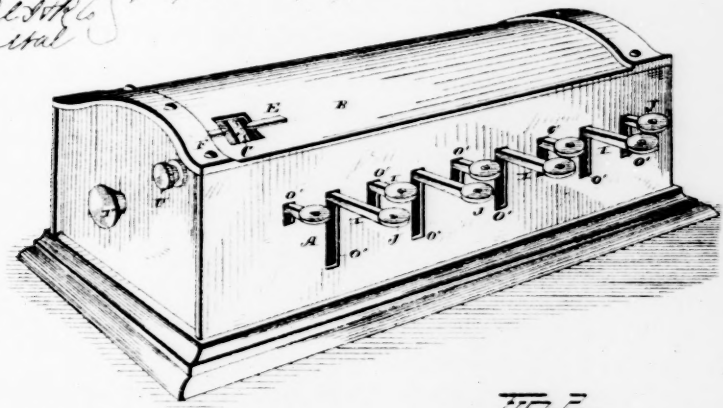
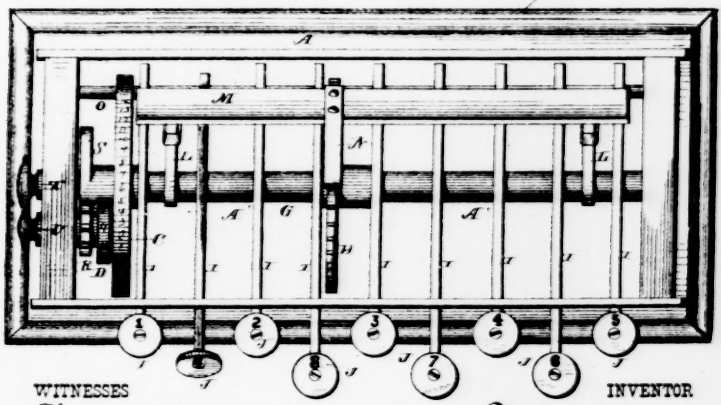


Fig. 2.



WITNESSES

E. C. Nottingham

Herman Moran

INVENTOR

Fawcett Plumb.

By H. A. Seymour.

ATTORNEY

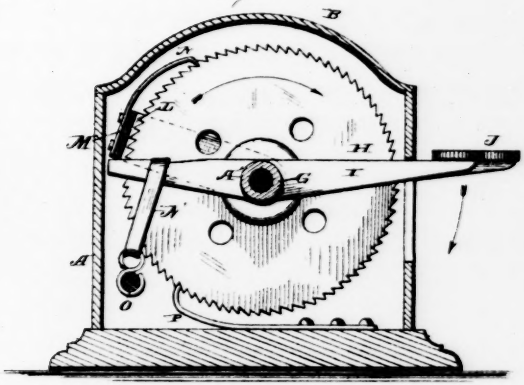
(Model.) 2 Sheets—Sheet 2.

F. PLUMB.

ADDING MACHINE.

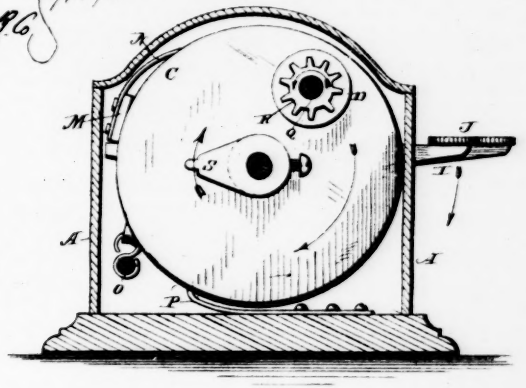
No. 256,591. Patented Apr. 18, 1882.

Fig. 3.



No 155.
N.C.R.C.
B.C.C. & R.C.
Md.
h 198

Fig. 4.



WITNESSES

E. C. Nottingham

Herman Moran

INVENTOR

Fawcett Plumb.

By his Attorneys.

ATTORNEY

and of the two levers L, to the outer ends of which the bar M, adapted to be actuated by any one of the keys J, is secured. Washers A′, interposed between the levers, keep them in their proper positions.

A pawl, N, attached to the bar M is adapted to engage with the cog-teeth of wheel H and revolve the same, together with the shaft G and the units and tens wheel C, when the said bar is elevated by the depression of any one of the nine keys J aforesaid.

The inner ends of all of the levers I are held under constant tension by means of elastic bands N′, or any equivalent therefor, the opposite ends of said bands being respectively secured to the levers and to a rod, O, located below them and running parallel with the shaft G. The two levers L, to which the bar M is secured, are also depressed with elastic bands which serve to keep the said bar in contact with the upper faces of the levers, and thus in immediate readiness to be elevated by the depression of any one of the keys. The equivalent suggested in lieu of elastic bands may consist of spiral or elliptic springs, or, if desired, counter-weights may be employed. The forward ends of the nine levers I project through a series of nine elongated slots, O′, of unequal lengths, formed in the front wall of the case A.

The amount of reciprocation of each of the levers is limited only by the length of the several slots in which they play, and therefore the slots must be nicely graduated to allow, with the depression of the keys, an elevation of the bar M, and the consequent revolution of wheel H and shaft G, a revolution of the units and tens wheel C through an arc embracing figures equal in number to the number expressed by the key which is depressed. It is therefore apparent that no two of the nine slots can be of equal length, and that every slot will be increased in length over the slot for the number next below it on the scale by one-ninth.

A pawl, P, located below wheel H, in position to engage with its cog-teeth, serves to prevent any undue motion thereof.

200–204 The hundreds-wheel D, encircled by a series of figures running from 1 to 10, is mounted on a short shaft, Q, journaled in one end of the case. The said shaft Q also supports a cog-wheel, R, provided with ten cog-teeth, with which a cam, S, rigidly secured to the shaft G is adapted to be engaged to move the hundreds-wheel one-tenth of a revolution to every complete revolution of the units and tens wheel. Ten revolutions of the units and tens wheel are therefore required in the regular operation of the instrument through the keys to effect one complete revolution of the hundreds-wheel. However, to facilitate the operation of setting the instrument, the shaft G is provided with a thumb-nut, T, by means of which the wheel C can be revolved independently of the system of levers and keys before explained, and the short shaft Q is provided with a thumb-nut, U, whereby the hundreds-wheel may be revolved independently of the cog-wheel R and cam S.

The instrument is designed to be used chiefly in adding up long columns of figures, and the accountant need not necessarily look away from them to operate it successfully, for the reason that as

there are but nine keys he can learn by little practice to distingu[illegible]ish them by touch.

In view of the description of the operation of the instrument, interspersed with the description of the instrument itself, a further exposition thereof is not deemed necessary.

Having fully described my invention, what I claim as new, and desire to secure by letters patent, is—

1. In an adding-instrument, the combination, with the casing having the graduated slots, and the slotted top and pointers F E, of a transverse shaft, G, carrying the wheels C and H, and cam S, a short shaft arranged parallel to shaft G and carrying the wheels D and R, the levers L L, bar M, cam N, and a series of operating-levers, all arranged and adapted to operate substantially as set forth.

2. In an adding-instrument, the combination, with the shafts G and O, of the bar M, pawl N, levers L L, and elastic bands connecting the latter with the shaft O, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 9th day of June, 1881.

FAWCETT PLUMB.

Witnesses:
N. PLUMB.
JOHN B. PLUMB.

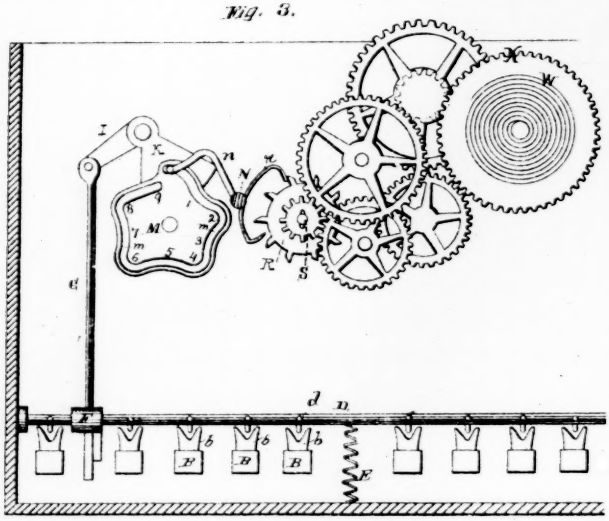
(No Model.) 2 Sheets—Sheet 2.

P. C. FORRESTER.

ADDING MACHINE.

No. 249,606. Patented Nov. 15, 1881.

Fig. 3.



No 153
N. C. R. Co's
v.
B. O. & P. R. Co's
et al.
p. 204

Witnesses
Frank A. Brooks
Geo. H. Strong

Inventor
Peter C. Forrester
by Dewey & Co Attys

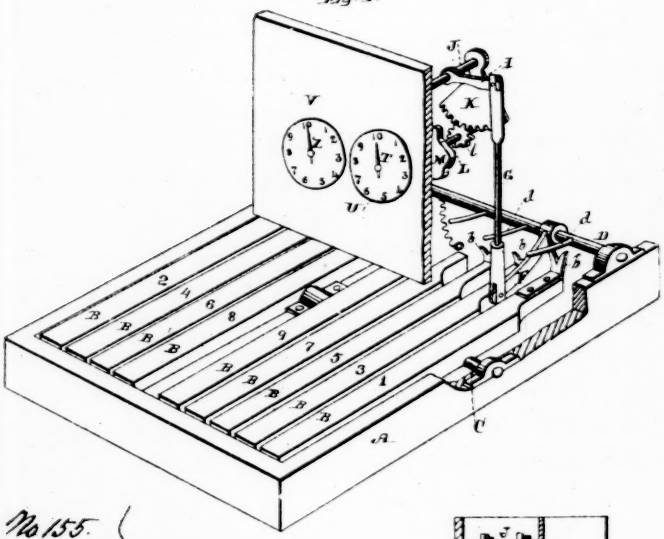
(No Model.) 2 Sheets—Sheet 1.

P. C. FORRESTER.

ADDING MACHINE.

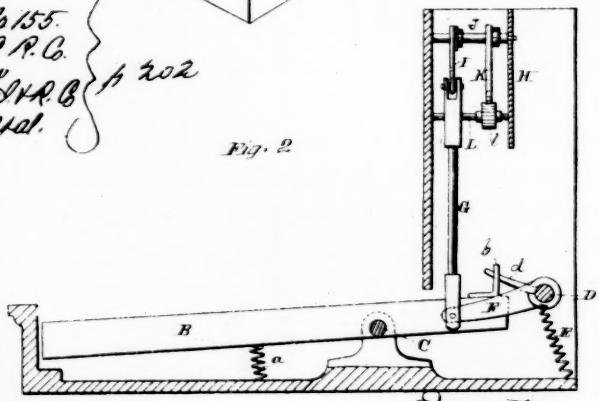
No. 249,606. Patented Nov. 15, 1881.

Fig. 1.



No 155.
N. C. R. R. Co.
B. C. & A. R. R.
et al.
v.
P. C. Forrester
No 202

Fig. 2.



Witnesses:
Thos. A. Banks
Geo. H. Strong.

Inventor
Peter C. Forrester
By Dewey & Co. Atty's

205 UNITED STATES PATENT OFFICE.

PETER C. FORRESTER, of San Francisco, California.

Adding-machine.

Specification forming part of Letters Patent No. 249,606, dated November 15, 1881. Application filed July 5, 1881. (No model.)

To all whom it may concern:

Be it known that I, PETER C. FORRESTER, of the city and county of San Francisco, State of California, have invented an adding-machine; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the class of adding-machines the design of which is to record the sums of successive figures by mechanical appliances without any other mental operation than is necessary to work the machine.

The principle of my invention is the operation of needles upon dials by means of a key-board through intermediate mechanism, whereby the escapement governing the needles is regulated to respond to the action of individual keys denoting the nine digits, all of which will hereinafter more fully appear, reference being made to the accompanying drawings, in which—

(Here follow diagrams marked pp. 202 and 204.)

Figure 1 is a view of my invention. Fig. 2 is a longitudinal vertical section. Fig. 3 is a view of the mechanism.

Let A represent a frame-work, having an upright portion and a key-board resembling somewhat an upright-piano. Upon the key-board are keys B, having their fulcrum upon a shaft, C, as shown. For convenience I have placed four keys upon one side of a dividing-line and five on the other. The keys represent each number up to nine, and are so properly designated, from which it will be seen that I prefer to place the odd numbers on one side and the even on the other, following in this arrangement nothing but convenience, deeming it easier to rapidly pick out each number when thus divided. Under each key is a small spring, *a*, which forces it up after being pressed down. In the upright portion of the frame, near the lower part, is journaled a shaft, D, to which are secured projecting pins *d*, there being nine in all, one for each key, and projecting toward and over each key. Upon the rear ends of the keys are forked arms or lifters *b*, in the forks of which the projecting pins *d* lie when said keys are pressed down in front so that their forks are raised to meet the pins.

E represents springs, which hold the shaft in its proper position—that is, with the pins about horizontal.

The operation thus far is as follows: If any key be pressed down in front its rear end is raised and its forked arm engages with and

presses up the pin, and thus turns the shaft D. When the key is released its spring *a* causes it to return, and the shaft D, being released, will turn back, being drawn by its spring E. The shaft D is therefore a rocking or oscillating shaft.

Attached to the shaft D, near one end, is a downwardly-inclined crank-arm, F, to the end of which an upright rod, G, is pivoted. H represents a plate supported from and parallel to the front of the frame A by end posts or supports. The top of the upright rod G is pivoted to a crank-arm, I, secured upon a horizontal shaft, J, journaled in the frame and in the plate H.

Upon the shaft J is secured a gear-segment, K, the teeth of which engage with a pinion, *l*, upon a shaft, L, journaled between the frame and plate H. The shaft L carries a peculiar plate, M, an enlarged view of which is shown in Fig. 3. It has five points, and the lines joining said points are concaved, as shown. In one side is a groove, *m*, around the edge following the contour thereof and closed at both ends, so that said groove is not continuous, though nearly so. This groove may, therefore, be divided into a series of lowest points and of highest points, or of depressions and elevations, the former being at the middles and the latter at the points. For a more perfect understanding of the purpose of the plate I have marked it as follows, and will explain the reason as I proceed: Beginning, therefore, with the first depression, I mark it 1; elevation following, 2; next depression, 3, and so on, numbering the last depression 9. It will be perceived the starting-point or first elevation I have not numbered.

N is a shaft, carrying the bent rod *n*, the end of which fits within the groove *m* of the plate M, and is adapted to move in said groove as the plate is turned, thus following the contour of the groove. Upon the same shaft N is the double arm escapement Q, engaging with the escapement-wheel R upon a shaft, S. Upon the same shaft S, which extends through the front of the frame, is a dial-finger, T, upon a dial, U. This dial is divided into units, commencing
206 at zero and running through nine. Now, suppose the rod G is lifted, it turns the shaft J, and, through the gear-segment K and pinion *l*, turns the plate M. If it be lifted a little, so that the plate M turns one side, the rod *n* will follow the groove *m* down to one depression and to one point or elevation. In doing this it releases the escapement twice, once at the depression marked 1 and once at the elevation marked 2, because in traveling in said groove it rocks the shaft N, so that one arm of the escapement releases the escapement-wheel to move half a tooth, and on the return-rock causes the other arm to release the wheel the other half tooth. This allows the dial-finger T to move one space. The dial-finger is moved by clock-work, as hereinafter shown. It takes two movements of the shaft N and double arm to allow the escapement-wheel to move one tooth. These two movements are obtained by causing the shaft to rock forth and back by means of the bent rod *n* traveling in the groove *m*. As the rod goes down in the depression 1 of the groove the shaft rocks down, and as it goes up to the following elevation the shaft rocks up, and the two together allow the escapement to

score one. It is obvious that if I turn the plate M only just far enough to rock the shaft N down and then turn it back again the shaft N must rock up, because the rod *n* returns to an elevation in the groove *m*. This being the case, I utilize the return of the plate M and make it score an equal number as in its forward movement, thus always bringing it back to the start.

The forked arms or lifters *b* upon the rear end of each key are so set that they can only move the rocking shaft D a certain distance. Thus the arm belonging to the key marked 1 is so low that it does not touch the pin *d* of the shaft until the key is nearly down to its limit, and then it raises it enough to cause plate M above to turn from the start as far as the depression marked 1, and this, as before explained, causes the escapement to score one-half. When the key is released the shaft D is rocked back by its springs E and causes the plate M to return, and the escapement is allowed to score the other half, thus causing the dial-finger to record one. When I touch key 2 its lifter rocks the shaft D sufficiently to turn the plate M from the start down to and past depression 1 up to elevation 2, thus scoring two halves, or one, and on return of the shaft and plate M the other one, thus recording two. The lifters continue to be thus adjusted through all the units. When key 9 is pressed down the shaft D is rocked so far that the plate M turns around past all the depressions and elevations, scoring nine halves, and on the return the other nine halves, making eighteen movements, and recording nine units on the dial-plate. The numbers here shown indicate the principle.

My escapement-wheel has ten teeth; but I could have one with twenty and reduce the motion in other ways. If any change be made in proportion it can be regulated to suit. The principle is in the adjustment of the keys to operate the escapement substantially in the manner shown.

The number of wheels might be reduced by forming the irregular groove *m* in the gear-segment K and directing the bent rod *n* therein. The principle would remain the same.

Upon the face of the frame A is another dial-plate, V, with numbers denoting tens, and the relation existing between the two dial-plates is the same as is found in gas-meters, cyclometers, and similar instruments.

W represents the motor-spring, adapted to be wound up as a clock. The shaft on which it is carries the large gear X, from which motion is transmitted through appropriate gears to the dial or escapement-shaft S and to the shaft which operates the dial-finger Z of the dial-plate recording tens. This system of wheels I have not deemed it necessary to particularly set forth, because it is the mechanism of any ordinary clock, and will not require the exercise of invention to comprehend. It is sufficient to say that for every ten units recorded on the dial-plate U one ten is recorded on the dial V. The same principle will apply to a dial adapted to record hundreds.

Now, I use the device for adding as follows, given a column of figures like this for example:

2 3
5 6
8 9

I press the key 9, and the first dial records 9; then press key 6, and the finger goes around to 5, while the other dial records 1; then press key 3 and the finger indicates 8, thus showing from both dials that 18 is the sum of the first row. Put down 8, then move the dial-finger to zero again. The second dial-finger is adapted to be turned by simply moving it around with the hand, it being upon a loose sleeve and moved by friction in a manner well known. The first finger can be run around quickly by the keys; then having one to carry, touch key 1, then 8, 5, and 2 in succession, and the first dial-finger will indicate 6 and the second 1. Put down 16. That by the side of the 8 will give the result—168.

In short columns the device is not as useful as in long ones. When the latter have to be added the time taken in turning the dials after each row is not noticeable.

Although I have described the lifters upon the ends of the keys as being simply metal forks, it is obvious that I could improve upon them by making them adjustable by set-screws, so that each could be set to move the rocking shaft with accuracy.

Having thus described my invention, what I claim as new, and desire to secure by letters patent, is—

1. In an adding-machine having a dial-plate and indicator adapted to be moved by clock mechanism and an escapement, the oscillating plate M, with its groove *m* for releasing said escapement, when arranged substantially as herein set forth.

207–210 2. In an adding-machine having dial-plates and indicators adapted to be moved by clock mechanism and an escapement, the oscillating plate M, with its groove *m* for releasing said escapement, in combination with the means for oscillating said plate, consisting of the pinion *l*, segment K, crank I, upright rod G, crank F, rocking shaft D, with its pins *d*, and removable keys B, with their adjusted lifters *b*, when arranged substantially as and for the purpose herein described.

3. The keys B, with their adjusted lifters *b*, rocking shaft D, with its springs E and pins *d*, crank F, upright rod G, crank I, shaft J, gear-segment K, pinion *l*, shaft L, plate M, with its groove, bent rod *n*, shaft N, escapement-arms Q, escapement-wheel R, dials U and V, with their dial-fingers, in combination with clock mechanism for moving said dial-fingers, the whole forming an adding-machine when arranged and used substantially as herein described.

In witness whereof I have hereunto set my hand.

PETER C. FORRESTER.

Witnesses:
WM. F. BOOTH.
J. H. BLOOD.

W. P. BORLAND & H. HOFFMANN

Adding Machine.

No. 205,993 Patented July 16, 1878.

Fig. 1.

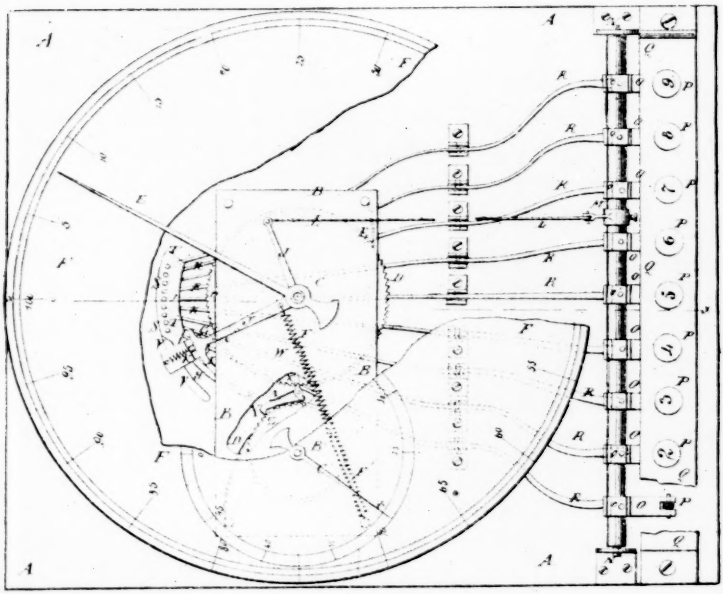
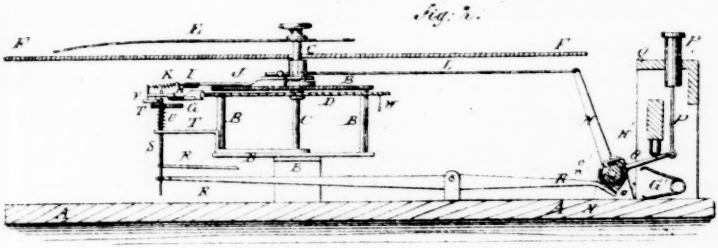


Fig. 2.



WITNESSES:

Chas. Neal

L. Bridgwick

No. 155 N.C.R.R. Co. } p. 210
B.C.I. & R.R. Co.

INVENTOR:

W. P. Borland

H. Hoffmann

BY Munn & Co.

ATTORNEYS.

211 UNITED STATES PATENT OFFICE.

WILLIAM P. BORLAND and HERMAN HOFFMANN, of Leavenworth, Kansas.

Improvement in Adding-machines.

Specification forming part of Letters Patent No. 205,993, dated July 16, 1878; application filed May 14, 1878.

To all whom it may concern:

Be it known that we, William P. Borland and Herman Hoffmann, of Leavenworth, in the county of Leavenworth and State of Kansas, have invented a new and improved adding-machine, of which the following is a specification:

(Here follows diagram marked p. 210.)

Figure 1 is a top view of our improved machine, parts being broken away to show the construction. Fig. 2 is a vertical section of the same, taken through the line *x x*, Fig. 1.

Similar letters of reference indicate corresponding parts.

The object of this invention is to furnish an improved machine which shall be so constructed as to enable the user to add up a column of figures quickly and accurately, and without it being necessary for him to look at the machine, so that no time may be lost in looking from his machine to the column of figures to be added, and which at the same time shall be simple in construction, accurate in operation, and may be used with great rapidity.

The invention consists in the combination of the springs, the levers provided with pawls, the shaft provided with the notches or stops, the arm, the connecting-rod, the elbow-lever, the spring-pawl, and the retraction-spring with the toothed wheel, the shaft, the pointer, and the dial-plate; in the combination of the springs, the levers provided with cams, the shaft, the levers, the spring-pins, and the curved bar with the spring-pawl for withdrawing the said pawl from the toothed wheel; and in the combination of the pin, the lever, the pawl, and the spring with the counting-wheels for transferring motion from the one to the other of the said wheels, as hereinafter fully described.

To the upper end of the shaft C is attached a pointer, E, which moves around the circle of division-marks upon the dial-plate F, through which the said shaft C passes, and which is attached to and supported by the frame B or other suitable support. Around the edge of the dial-plate F are formed one hundred division-marks. G is a pawl, which is formed upon or attached to the end of an arm, H, the end of which is pivoted to the end of an arm, I, formed upon or attached to the end of one arm of the elbow-lever J. The elbow-lever J is pivoted at its angle to the shaft C. The pawl G is held against the teeth of the wheel D by a spring, K, one end of which is attached to said pawl, and its other end is attached to the end of the arm of the lever J. To the end of the other arm of the elbow-lever J is pivoted the end of a connecting-rod, L, the other end of which is pivoted to an arm, M, rigidly attached to the shaft N

The shaft N works in bearings attached to the base A, and upon it are placed nine levers, O, which are kept at proper distances apart by washers placed upon the said shaft N, between the said levers, as shown in Fig. 1. To the outer ends of the levers O are attached, or with them are connected, a set of knobs, P, which knobs I prefer to have pass up through the key-board Q, so that they may be kept in proper relative position, and in such a position that they may be readily found by the fingers of the operator. The knobs or keys P are marked with the numerals in their regular order. To the forward parts of the levers O are attached, or upon them are formed, hooks or pawls o', which enter notches n' in the shaft N, as shown in Fig. 2, so that the said shaft may be turned through a part of a revolution by the downward movement of the outer end of either of the said levers O, the said notches n' being made of such a length that the shaft may be turned by one of the said levers O without moving the other levers.

By this construction, by pressing the outer ends of the levers O downward, the elbow-lever J will be operated to carry the pawl G forward, turning the wheel D and shaft C and moving the pointer E forward over the dial-plate F. Upon the lower side of the inner ends of the levers O are formed cams o^2, which, when the said levers are turned to turn the shaft N, act upon and operate the levers R. The levers R are pivoted to supports attached to the base A, and through holes in their forward ends pass the lower ends of the pins S, or of small tenons formed upon the ends of the said pins. 212–214 The upper ends of the pins S pass through guide-holes in a frame T, attached to and supported by the frame B. The pins S are held down until raised by the levers R, and are forced down after being raised by coiled springs U placed upon their upper parts. The lower ends of the coiled springs U are attached to the said pins S, and their upper ends rest against the lower side of the top bar of the guide-frame T. To the pawl G is attached a curved bar, V, the forward end of which is beveled off, as shown in Fig. 1.

With this construction, when either of the levers O is operated to revolve the counting-wheel D, the same movement of the said lever operates a lever, R, to raise a pin, S, so that the pawl G will be withdrawn from the counting-wheel D when it has carried that wheel forward as many teeth as was indicated by the number of the lever O that was operated—as, for instance, when lever 4 is operated, the fourth pin will be raised so as to withdraw the pawl G when it has turned the wheel D through the space of four teeth. The pawl G is withdrawn from the wheel D by the inclined or beveled forward end of the curved bar V striking against the upper end of the pin S, that was raised so as to force the pawl G outward and away from the teeth of the wheel D. To the under side of the wheel D is attached a pin, W, which, at each revolution of the said wheel D, strikes against the end of a lever, X, and operates it. The lever X is pivoted to a support attached to the frame B, and to its other end is pivoted a pawl, Y, which engages with the teeth of a toothed wheel, Z. The pawl Y is held against the teeth of the

wheel Z, and at the same time the lever X is held back in position for the pin W to strike it by a spring, A′, attached to the said lever X, and which bears against the said pawl Y.

The toothed wheel Z is attached to a shaft, B′, which works in bearings in the frame B, passes up through the dial-plate F, and has a pointer, C′, attached to its upper end. The end of the pointer C′ moves along a second scale of division-marks formed upon the dial-plate F, as shown in Fig. 1, the said scale having as many marks as the wheel Z has teeth. The wheel Z is kept from being turned back by the friction of the pawl Y by a spring-pawl, D′, attached to the frame B, and which rests against the teeth of the said wheel Z. The wheel D is kept from being drawn back by the friction of the pawl G by a spring-pawl, E′, attached to the frame B, and which rests against the teeth of the said wheel D. The elbow-lever J is moved back after carrying the pawl G forward to turn the wheel D by a spring, F′, attached to it, and the other end of which is attached to the frame B.

By this construction the units and tens of the numbers added will be indicated by the pointer E, and the hundreds will be indicated by the pointer C′. Other counting-wheels may be added to the machine, if desired.

With this construction, as the operator becomes familiar with his machine, he can operate the levers to add the consecutive numbers of the column of figures without looking at the machine or removing his eyes from the figures being added, so that the work can be done very accurately and very rapidly.

The levers O are raised into their normal position after being lowered by the operator by means of springs G′ attached to the base A, and which rest against the lower side of the levers O. As the levers O are raised by the springs G′ they strike against a pad, H′, of rubber or other suitable material, attached to a bar of the key-board frame, so as to prevent any jar or noise when the said levers return to their places after being operated.

Having thus fully described our invention, we claim as new and desire to secure by letters patent—

1. The combination of the springs G′, the levers O, provided with the pawls o^1, the shaft N, provided with the notches or stops n', the arm M, the connecting-rod L, the elbow-lever J, the spring-pawl G K, and the retraction-spring F′ with the toothed wheel D, the shaft C, the pointer E, and the dial-plate F, substantially as herein shown and described.

2. The combination of the springs G′, the levers O, provided with the cams o^2, the shaft N, the levers R, the spring-pins S U, and the curved bar V with the spring-pawl G K, for withdrawing the said pawl G K from the toothed wheel D, substantially as herein shown and described.

WILLIAM PATTERSON BORLAND.
HERMAN HOFFMANN.

Witnesses:
DAVID SIMON.
JOHN SCHOTT.

215 UNITED STATES PATENT OFFICE.

MATHEW HOWIE, of Philadelphia, Pennsylvania.

Improvement in Recorders.

Specification forming part of Letters Patent No. 185,537, dated December 19, 1876; application filed September 27, 1876.

To all whom it may concern:

Be it known that I, Mathew Howie, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful register for cash receipts of bar-keepers, cashiers, and other persons; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification, in which—

(Here follows diagram marked p. 214.)

Figure 1 is a transverse vertical section of my invention. Fig. 2 is a transverse vertical section of the box and a side elevation of the mechanism. Fig. 3 is a front elevation of my invention; Fig. 4, detail perspective.

The object of my invention is to provide a device or apparatus for registering the cash received by bar-keepers, cashiers, and other like parties presiding over money desks or offices.

A further object of my improvements is to provide means for determining the amount of liquor or other article disposed of, thereby keeping an account of stock, the registered cash receipts showing the stock on hand, as well as that sold, as hereinafter more fully set forth.

In the accompanying drawings, which indicate my improvements applied to a liquor-bar, A is a box or case, to be placed in a conspicuous position, as the front of the counter, where it will be in full view of the patrons of the bar, and within easy reach of the bar-keeper. B B are push-buttons, marked with figures, as 5, 10, 15, &c., or with the names of the different liquors, as wine, brandy, beer, &c., there being, of course, only one number or name on each of said buttons. The stems *b b* pass down through the lid *a* of the case A, and through suitable openings in a ledge or bracket, C, being provided with spiral springs *c c*, by which the buttons are automatically elevated after being depressed, as hereinafter more fully set forth.

D D are curved pawls, pivoted on the lower extremities of the stems *b b*, and provided with pointed pins or teeth *d d*, by which strips of paper E E are unwound from reels F, and punched whenever payment for a drink or drinks is made. G is a spring-dog secured at *g* to the bracket C, and having an opening, g^1, for the

M. HOWIE.

RECORDER

No. 185,537. Patented Dec. 19, 1876.

Fig. 1

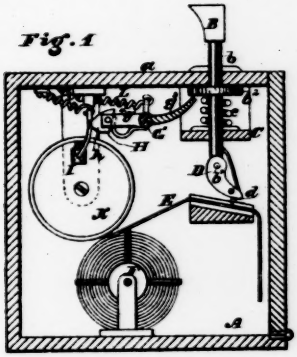
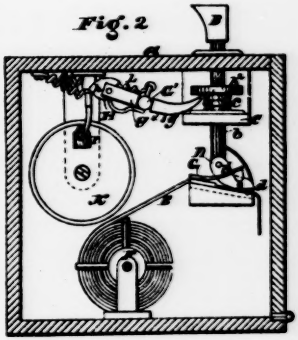


Fig. 2



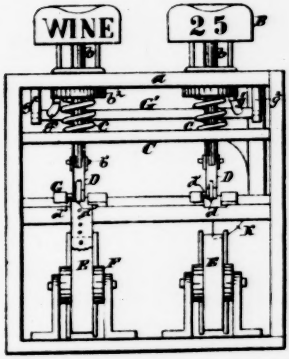
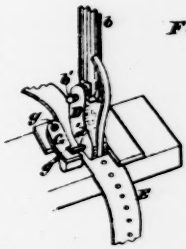


Fig. 3

Fig. 4



No 155 N.C.R.Co } p. 214
B.C.R.R.Co

Witnesses
Saml J. Van Atwoven
Jos. R. Connolly

Inventor
Mathew Howie
By
Connolly Bros, Attorneys

passage of a stud, d', which projects from the sides of each of the pawls D. The object of the dog G is to cause the pawl D to be raised on its backward motion, so as to make the tooth d clear the paper E and avoid dragging back the latter.

When the button B is depressed on receipt of payment for a drink, the pawl D is brought down upon the paper E, the tooth d entering and passing through the latter. Continuing the downward movement of the button the pawl D advances, swinging on its pivot b^1, and carrying forward the paper which it unwinds from the reel F. At the same time the stud d' passes through the opening g^1, raises the dog G, and comes out in front of the latter, which then drops or springs downwardly. On releasing the pressure on the button B the spring c throws up the stem b. The stud d' is thus compelled to ride over the face or front of the dog G, and by so doing elevates the pawl D, so that its tooth d will clear the paper E.

G′ represents a shaft, supported in hangers g^2 g^2, secured to the lid a, and provided with forwardly-projecting arms g^3 g^3, which are met by collars b^2 on the stems b whenever the buttons B are depressed, causing said shaft G′ to rock. g^4 is a rearwardly-projecting arm on the shaft G′, having a spring-pawl, H, shouldered at h, by which a hammer, I, is caused to strike a bell, K, sounding an alarm whenever a payment for drinks is made, and the button B duly depressed to register the same. L is a spring to cause the return of the rock-shaft G′ to its normal place, and the arms g^3 g^3 to their position just below the collars b^2, after each depression of any one of the buttons B.

The operation is substantially as follows: Suppose a party obtains and pays for a drink of wine, the charge for which is, say, twenty-five cents. If the push-buttons be marked with the names of the various liquors sold at the bar, the bar-keeper will depress that one of the said buttons which is marked "wine," causing one hole to be punched in the strip E, which belongs to said button, and an alarm to be sounded on the bell K. If the buttons be marked with the numerals, that one of them which bears a number corresponding to the price of the drink will be operated in like manner and with a similar effect. By having the buttons marked with the name of the liquors the amount of money received for each kind can be ascertained on examination of the registry-strips. Thereby the quantity of each liquor sold can be determined, and by deducting the same from the quantity first provided the amount of stock on hand can be readily computed. In this way a double check can be kept on the bar-keeper. For instance, suppose wine is twenty-five cents a drink and beer five cents. The bar-keeper, on receiving payment for a drink of wine, might be tempted to register as for a drink of beer, and, yielding to the temptation, to defraud the proprietor out of twenty cents—a procedure which might possibly be connived or winked at by those who usually frequent drinking-saloons. But he would thereby render himself liable to detection, for the proprietor, on measuring his wine, would see that some of it had been disposed of without a corresponding registry of payment therefor. On the other hand, if the registry be

216–220

honestly kept, the exact amount of each liquor can be determined, as already stated, by examination and computation, without measuring.

If desired, a separate set of buttons—numbered 5, 10, 15, &c.—may be allotted to each beverage dispensed at the bar, the names of each such beverage being marked on its set of buttons, or on a single sign erected in any suitable position close to said set, so as to show its relation to the same.

I have shown and described the improvements as adapted to a bar; but their employment is not restricted thereto, being, with slight modifications within the spirit of my invention, equally well adapted to eating-saloons, confectioneries, drug-stores, ticket-offices, ferry-gates, and other places where employés are entrusted with receiving cash in separate small sums, and where an accurate registry and control of said receipts are desirable.

What I claim as my invention is—

1. The combination, with the case A, of the push-buttons B B, marked with names or numerals, pivoted pawls D D, teeth or punches *d d*, and paper strips E, substantially as shown and described.

2. In combination with the pivoted pawl D and tooth *d*, the dog G, arranged substantially as described, to elevate said pawl and cause said tooth to clear the paper E on the return or upward motion of the stem *b*, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 16th day of September, 1876.

MATHEW HOWIE.

Witnesses:

M. DAN'L CONNOLLY.

CHAS. F. VAN HORN.

2 Sheets—Sheet 1.

J. WINDMÜLLER & F. AHRENS.

Register and Indicator.

No. 217,663. Patented July 15, 1879.

Fig. 1.

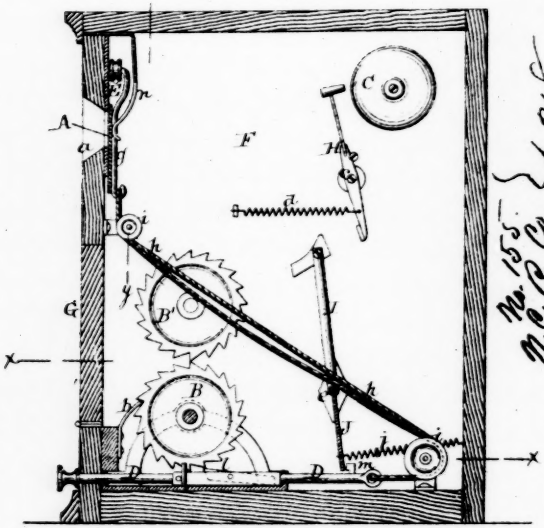
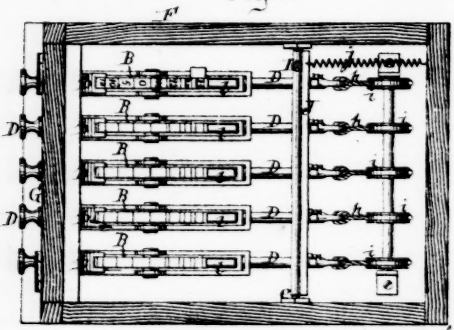


Fig. 2.



Witnesses.
Chas. Wahlers.
William Miller

Inventors.
John Windmüller
Frederick Ahrens
by Van Santvoord, Hamp & their attys

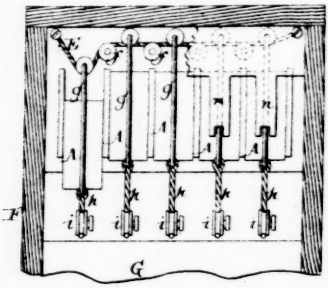
2 Sheets—Sheet 2.

J. WINDMÜLLER & F. AHRENS.

Register and Indicator.

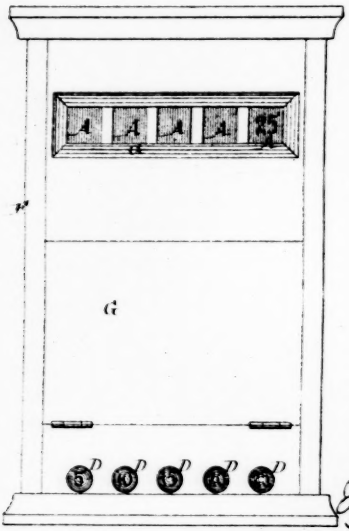
No. 217,663. **Patented July 15, 1879.**

Fig. 3.



No. 155 C. R. C. } M. 220
R. C. Sht. C.

Fig. 4.



Witnesses.
Chas. Wahlers.
William Miller

Inventors.
John Windmüller
Frederick ahrens
by Van Santvoord & Hauff
their attys

221 UNITED STATES PATENT OFFICE.

JOHN WINDMÜLLER and FREDRICK AHRENS, of New York, N. Y.

Improvement in Register and Indicator.

Specification forming part of Letters Patent No. 217,663, dated July 15, 1879; application filed April 23, 1879.

To all whom it may concern:

Be it known that we, John Windmüller and Fredrick Ahrens, both of the city, county, and State of New York, have invented a new and useful improvement in alarm-registers for use in bar-rooms, &c., which improvement is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

(Here follow diagrams marked pp. 218 & 220.)

Figure 1 represents a vertical cross-section of a register embodying our invention. Fig. 2 is a horizontal section thereof in the plane of the line *x x*, Fig. 1. Fig. 3 is a vertical longitudinal section of a portion thereof, showing the arrangement of the indicators, the plane of section being indicated by the line *y y*, Fig. 1. Fig. 4 is a front elevation of the apparatus.

Similar letters indicate corresponding parts.

This invention relates to registers especially intended for bar-rooms; and consists in a novel combination of parts for actuating indicators and registering-wheels.

The improvements will be fully hereinafter described, and specifically pointed out in the claims.

In the drawings, the letter A designates an indicator; B, a general register; C, the bell or gong of an alarm; D, a prime mover, and E means or mechanism for retracting the indicator, combined according to our invention, the parts being, in this example, arranged in series, and the whole being inclosed by a case, F, having a door, G.

The indicators A respectively consist of a slide which faces an opening, *a*, in the case F, and on which is marked a certain number; but other devices may be used in lieu of this slide—as, for instance, a revolving or oscillating disk or an index-hand. Said indicators, moreover, are each pressed upon by a spring, *u*.

Each of the general registers B consists of a toothed wheel, on a suitable part of which are marked the required figures, and with which is combined a detent, *b*. With these general registers B we connect a system of multiplying-gear, a portion of which is shown at B', Fig. 1; but as the arrangement of such gear is well known, an illustration thereof is deemed unnecessary. In this example the figures of the general registers B are marked on the faces of their teeth, and the detent *b* performs the function of an index; but this arrangement is capable of modification.

The bell-hammer (marked H) swings on a pivot, *c*, and is im-

pelled by a spring, *d*, while it is actuated by an arm, I, mounted on a rock-shaft, *e*. From the rock-shaft *e* projects a blade, J, which extends the whole length of said shaft, or nearly so, and to which is connected a retracting-spring, *j*.

In this example the mechanism for retracting the indicators A consists of a chain or cord, E, (see Fig. 3.) which is fastened at its opposite ends to the case F, and runs over pulleys *f*. Each of the indicators A engages with the chain or cord E by means of an arm, *g*, carrying a wheel which catches over the chain, and said chain or cord is made of such length that there is sufficient slack therein to allow one of the indicators to be moved to a lower position, this latter constituting its exposed position.

The prime movers D respectively consist of a slide, which carries a figure at the outer end, as shown in Fig. 4, and which is connected to one of the indicators A at the inner end by means of a chain or cord, *h*, running over pulleys *i*, while it carries a dog, *l*, (see Fig. 1,) whereby it is adapted to engage with one of the general registers. Each of the prime movers D, moreover, is provided with a projection, *m*, for the purpose of actuating the blade J appertaining to the alarm. The spring *j*, connected to the blade J, in acting upon the latter serves to retract the prime movers D, and retain the same in an inner position.

The operation of our register is as follows: When it is desired to register a certain amount—say ten cents—the prime mover marked with the figure 10 is pulled outward, whereby the appropriate indicator A is brought to an exposed position, the proper general register B is actuated, and the alarm is sounded. As the indicator referred to is drawn down it carries with it the chain E, and thus tightens the latter, so that the indicator previously exposed (one indicator being always exposed) is lifted or moved to a concealed position. One indicator is thus made to constitute the medium through which another is retracted.

222–226 When one of the indicators A is brought to an exposed position it is thrown out of gear with its prime mover D, and is unaffected by any immediately-following movements thereof, from the fact that the prime mover then merely takes up the slack in the rope or chain *h*, whereby the prime mover and the indicator are connected together. This, however, does not apply to the general registers and the alarm—that is to say, the latter are actuated at every motion of the prime mover.

When our register is to be used in a bar-room the parts are arranged in series of twenty and upward, and by its means the amounts received during the day can be registered, and afterward totalized by adding up the amounts shown by each register.

What we claim as new, and desire to secure by letters patent, is—

1. The slides D, provided with pivoted dogs *l* and projections *m*, having on their outer ends figures, in combination with the registering-wheels B, cords or chains *h*, pulleys *i*, indicators A, provided with arms *g*, slack horizontal cord or chain E, passing over pulleys *f*, and with which the arms *g* engage, and the rocking-arm I, for actuating the alarm, mounted on a rock-shaft, *e*, carrying a longi-

tudinal blade, J, with which one end of a retracting-spring, *j*, is connected, all substantially as described, whereby a sliding movement of the slide D will actuate the register, the indicator, and the alarm, and the spring *j* will retract the slide, as herein set forth.

2. In combination with the indicators A and the slack cord or chain E, passing over pulleys *f*, the arms *g*, engaging said cord or chain and attached to the indicator, the cords or chains *h*, connected with said indicators and extending downward over pulleys, and the slides D, attached at their rear ends to said cords or chains *h*, and provided with pawls *l*, for actuating the registering-wheels, all substantially as and for the purpose described.

In testimony that we claim the foregoing we have hereunto set our hands and seals this 19th day of April, 1879.

JOHN WINDMÜLLER. [L. S.]
FREDRICK AHRENS. [L. S.]

Witnesses:
W. HAUFF.
CHAS. WAHLERS.

227 UNITED STATES PATENT OFFICE.

CLINTON H. MALTBY, of Dayton, Ohio, assignor to the National Manufacturing Company, of same place.

Cash-register.

Specification forming part of Letters Patent No. 318,485, dated May 26, 1885. Application filed September 21, 1883. (No model.)

To all whom it may concern:

Be it known that I, Clinton H. Maltby, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful improvements in cash registers and indicators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to an improvement in cash registers and indicators designed for the use of store-keepers and others as a means of accurately registering the total cash receipts for any given period of time—as a day, for instance—and for indicating to the customers that the amount paid has been registered by disclosing to their view such amounts upon figured tablets.

Like the machine shown in patent No. 271,363, dated January 30, 1883, to Ritty and Birch, upon which this is an improvement, the arrangement and operation of the parts are such that no tablet can be exhibited without its value being counted upon the registering mechanism, and whenever any tablet is disclosed it remains so until the machine is operated to disclose a second tablet.

In the patent to Ritty and Birch, before referred to, the registering mechanism consisted of a series of independent abutting figured disks in one or more banks, each or each set of which was operated by its respective key. At the end of the day these disks would be turned more or less away from the zero or starting point, and no provision was made for resetting them to the zero-point for the commencement of the succeeding day's business.

My present invention has for its most important object the provision of means whereby a single complete revolution of each of the disk-shafts will cause the simultaneous resetting of all of the disks upon such shafts, so as to bring all of their zero-marks under the reading-apertures, which resetting can be done instantly without expenditure of labor and loss of time.

The novelty consists in the construction, arrangement, and combinations of the various parts, as will be herewith set forth and specifically claimed.

In the accompanying drawings—

(Here follow diagrams marked pp. 224 and 226.)

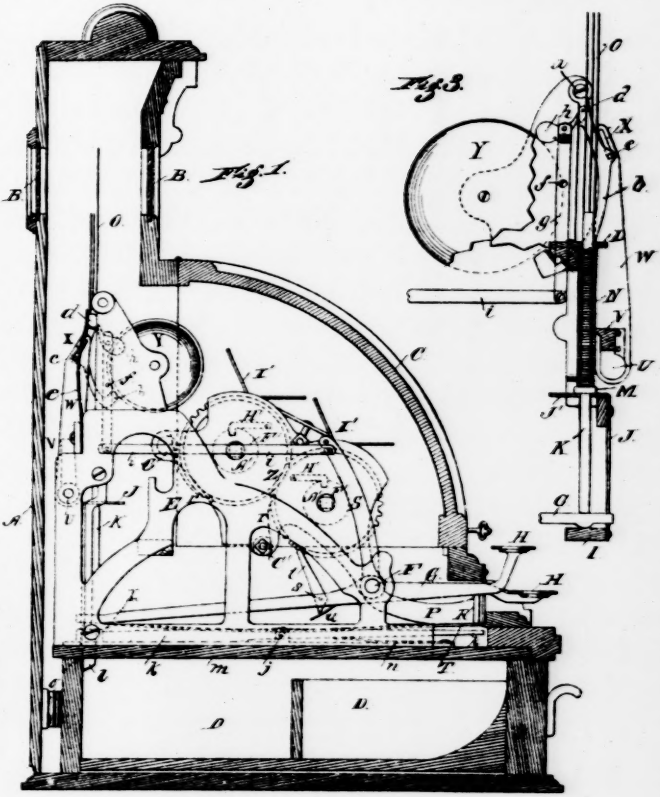
Figure 1 is a side elevation of my improved machine with the case and drawer in section. Fig. 2 is a plan view of the mechanism

(No Model.) 2 Sheets—Sheet 1.

C. H. MALTBY.

CASH REGISTER.

No. 318,485. Patented May 26, 1885.



Attest,
Jno. E. Wilkes
E. W. Burton

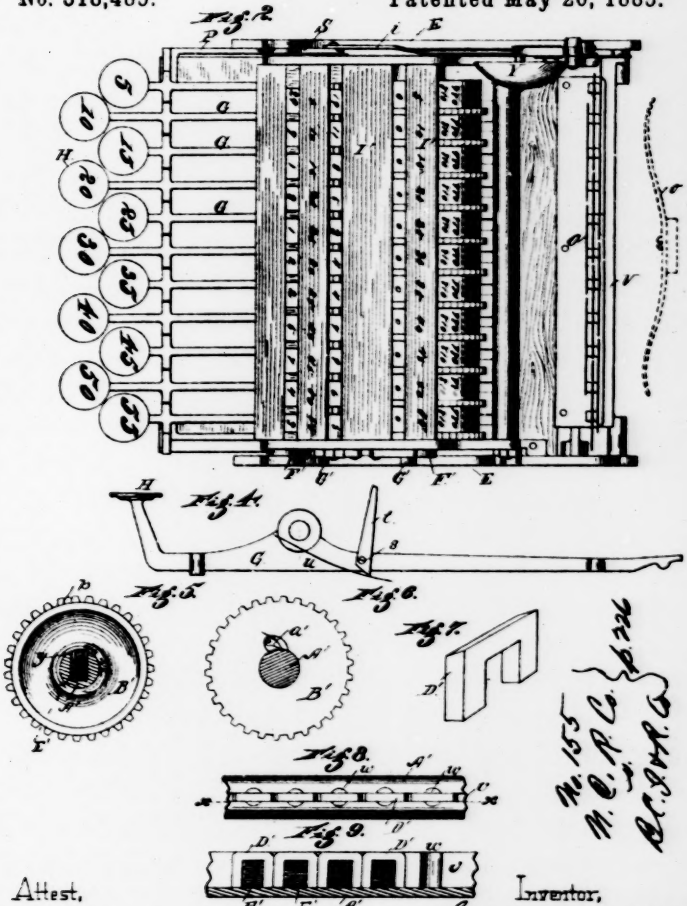
Inventor,
Clinton H. Maltby
by Stetson & Cobb
his Attys

(No Model.) 2 Sheets—Sheet 2.

C. H. MALTBY.

CASH REGISTER.

No. 318,485. Patented May 26, 1885.



No. 155 N. C. P. Co. 226 B. C. M. P. Co.

Attest,
Jno. E. Wiles
E. W. Peeler

Inventor,
Clinton H. Maltby
by Atwood Cook
his Attys

removed from the case. Fig. 3 is an enlarged detailed view in side elevation, looking toward the left of the machine, of the bell and tablet mechanism. Fig. 4 is an enlarged side elevation of one of the keys. Fig. 5 is an enlarged corresponding view of one of the registering wheels or disks with its shaft in section. Fig. 6 is a corresponding view showing the modification in the disk and shaft mechanism. Fig. 7 is an enlarged perspective view of one of the disk-resetting dogs. Fig. 8 is an enlarged plan of a portion of the disk-shaft with the dogs applied thereto. Fig. 9 is a sectional view through the line *x x* of Fig. 8.

The same letters of reference are used to indicate corresponding parts in all the figures.

I provide any suitable box or cabinet, A, ornamented as desired, and of the general shape indicated, though the shape and ornamentation may be varied infinitely, having coincident glass-covered apertures B, through its upper ends for disclosing to view the projected tablets; also having a hinged lid or door, C, upon opening which the registering mechanism is disclosed, and having, preferably at its lower end, a drawer-compartment, in which is a drawer or till, D. In this cabinet or case is fitted a metal frame-work consisting, chiefly, of two upright sides, E E, united by cross-bars and by the shafts and bars which support the operating mechanism.

Upon a transverse shaft or bar, F, in the lower front part of the machine, are hung or pivoted a series of parallel keys, G, which may be of the shape shown in Fig. 4, and each key has upon its front end, which extends through and projects from an opening in the front of the case, a button, H, upon which is marked a figure or number to correspond with the value intended to be indicated and registered whenever that key is operated by depressing the button. As in the Ritty and Birch patent, these keys may be arranged in banks to avoid unnecessarily increasing the width of the machine. The rear ends of the keys rest upon a bar, I, at the rear side of the machine, and extend through the slots in a vertically-
228 slotted guide-plate J, Fig. 3, by which means they are supported, held from lateral displacement, and guided at their rear ends. The plate J has its upper end bent at right angles, so as to extend in a horizontal plane, and through this bent portion J′ are a row of apertures to permit the passage of a series of vertical rods, K, preferably square in cross-section, to prevent their turning in their correspondingly-shaped guide-orifices in the plate J′. The lower ends of these rods K rest upon the rear ends of the keys G, one upon each key, and at their upper ends they are further guided by a transverse perforated horizontal plate or bar, L, Fig. 3.

Upon each rod K, just above the guide-plate J, is a swell or shoulder, M, between which and the bar L, and encompassing each rod, is a spiral spring, N. To the upper end of each rod is suitably secured a thin flat tablet, O, which has upon both of its faces a figure or number corresponding with that upon the button of the key upon which said rod rests and by which it is operated. Thus far the construction of the parts, with the exception of the springs N, is or

may be substantially that shown and described in the Ritty and Birch patent, before referred to.

Pivoted upon the shaft F, on each side of the machine, are two arms, P P, which extend forward and are connected at their front ends by a transverse bar, R, which rests just under the forward ends of the keys, as seen in Fig. 1. One of these arms P, preferably the one on the left side of the machine, has an upward extension, S, beyond its pivotal point, as shown. Flat springs T, on each side under the arms P and transverse bar R, serve to hold the keys up at their front ends and to replace the same when operated.

Pivoted at U, just in rear of the tablet-rods, is a horizontal wing, V, from one end of which extends upwardly an arm, W, whose upper end is slotted at X, Fig. 3.

Pivoted at *a* to the upper left-hand side of the frame is a pendent curved hammer, *b*, lying adjacent to the arm W, and with a lateral stud, *c*, entering the slot X. This hammer is arranged to strike a gong or bell, Y, suitably secured to the frame. Projecting laterally from the hammer is a lug, *d*, with its under side rounded or beveled, as seen in Fig. 1.

A flat spring, *e*, attached to the frame and bearing against the lug *d*, serves to hold the arm W and wing V in a substantially vertical position and to cause the hammer to strike the gong whenever any of the keys are operated, as will be hereinafter explained.

Pivoted at *f* is a vertical arm or lever, *g*, carrying at its upper end a pivoted gravitating tripping-dog *h*, which bears against the lug *d*, and which may be of the same construction and is for the same purpose as the corresponding part in the Ritty and Birch patent.

Connecting the lower end of the arm *g* and the upper end of the arm S is a link, *i*.

From this construction it will be seen that whenever any key is operated by pressing its button the arms P are forced down, the arm S thrown forward, thereby oscillating the lever *g*, whose tripping-dog *h* presses back the hammer *b*, which in turn oscillates the wing V through arm W and throws it sufficiently far back to permit the upward passage of the shoulder M upon the ascending tablet-rod, whereupon the adjustment of the parts is such that the tripping-dog *h* holds its engagement with the lug *d* until the key has been depressed to its farthest limit, the shoulder M raised above the wing V, and the tablet exposed to view through the apertures B of the case, at which time, when the key has reached its farthest limit of depression, the tripping-dog *h* slips past the lug *d* and frees the spring *e*, which, recoiling, causes the hammer to strike the bell and reset the wing V in a vertical position, so as to receive and retain the shoulder M, and thereby hold up the tablet in its exposed position until, another key being operated, the wing is again oscillated or thrown back to permit the passage upward of the other shoulder M, and consequently releasing the shoulder M of the before-operated tablet-rod, which, by the action of the spring N, aided by its own gravity, drops back to its normal position.

Pivoted, as at *j*, about the center of the bottom of the case, is an arm, *k*, whose front end extends under the bar R, and whose rear

end carries a bolt, *l*, which, passing through the bottom or division *m* of the case, engages with the rear inner side of the drawer to lock the same, as seen in Fig. 1. A flat spring, *n*, bearing upon the under side of the forward end of the bar *k*, serves to hold the bolt *l* down. The under side of the bolt *l* is beveled, as shown, with a corresponding bevel upon the edge of the rear side of the drawer, over which the bolt slips, so that in closing the drawer the bolt will be raised by the drawer in its passage until its rear side has passed beyond the bolt, when the same is freed and is forced down to effect a lock, as will be readily understood.

Fastened to the rear side of the case, just behind the drawer, is any suitable spring, *o*, a plan of which is shown by the dotted lines to the right of Fig. 2. This spring bears against the rear side of the drawer, and whenever a key is operated to its farthest limit the bar R, pressing upon the bolt-bar *k*, raises the bolt *l* until, the key having reached its farthest limit of depression, the drawer is freed, and the spring *o* propels the same partially out of the case. To relock the drawer it is only necessary to push it in until the bolt re-engages it.

While I have thus illustrated and described the drawer and its mechanism, I do not claim the same, as it forms the invention of John Birch, who will make a separate application for letters patent therefor.

Journaled in the frame of the machine, or, as in this instance, in a supplemental frame, Z, secured to the main frame, are two
229 parallel horizontal transverse shafts, A′, upon which are strung the independently-revolving abutting registering-disks B′. The external construction and arrangement of these disks are substantially those shown and described in the Ritty and Birch patent, before mentioned, and each has at its one edge as many spurs or teeth as there are figures upon the periphery of the disk, and those of the lower bank have an additional spur, *p*, Fig. 5, which is in line with the spurs of the disks in the bank above, so that every time a disk of the lower bank makes one complete revolution its spur *p* engages with one of the spurs of the coincident disk in the upper bank and turns the upper disk one notch. Upon the transverse shafts C′ are secured brake-springs *r*, (shown by the dotted lines in Fig. 1,) which prevent the disks from turning farther than one notch at a time when the keys are operated.

Pivoted to each key, as at *s*, is an upwardly-extending dog, *t*, which engages with the spurs of the disk directly over such key, as seen in Fig. 1. A spring, *u*, serves to support and hold in proper working position the dog *t*, and the adjustment is such that every time any key is operated to its farthest limit its registering-disk is revolved one notch. The return of the key to its normal position draws back the dog *t* for a fresh engagement.

As seen in Figs. 5, 8, and 9, the shafts A′ have a longitudinal slot, *v*, extending from end to end, with equidistant enlargements or bores *w* in the walls thereof. In these slots are a series of abutting staple-shaped dogs, D′, which are projected by spiral springs E′, confined in the bores *w* and between the lugs of the dogs, as seen

particularly in Fig. 9. There is one of these dogs for each of the disks, and they are so arranged as to be entirely independent in action, and to only engage with their respective disks. Their upper edges are slightly beveled, so that when the disks revolve upon the shafts in the direction indicated by the arrow in Fig. 5 no engagement of the dogs is effected. The journal or bearing of each disk, however, has a slight shoulder or notch, *y*, Fig. 5, which, when the shaft is revolved in the direction indicated by the dotted arrow in Fig. 5, enables the dogs to become locked with the disks and rotate the same. From this it will be seen that while during the operation of the keys the shafts A′ are locked stationary by means to be presently described the disks turn freely on the shafts without engaging the dogs; but when it is desired to reset the disks of either or both shafts to the zero or starting point a single complete revolution of the shafts in the proper direction will engage and pick up the disks during their revolutions until their shoulders or notches *y* are all in line, and then carry the same all together to such a point as brings the zero-marks under the reading-apertures, as seen in the upper bank of Fig. 2.

The advantage of using staple-shaped pawls instead of round or square ones is that a longer and more elastic spring may be used, and when the pall is projected its legs will retain a bearing within the shaft and prevent its rotation or displacement, as will be readily understood.

To hold the shafts locked I secure upon their outer right-hand ends disks F′, leaving the squared ends G′ of the shafts projecting beyond the disks F′ sufficiently to be grasped by a wrench or key. Each of the disks F′ has a notch with which the end of a pivoted gravitating locking-dog, H′, engages, as seen by the dotted lines in Fig. 1. The adjustment of the parts is such that whenever either of the dogs H′ is raised and the shaft A′ turned in the proper direction one complete revolution until the dog re-enters the notch and relocks the shaft the disks upon such shaft will have all been brought with their zero-marks exposed through the reading-apertures.

Instead of the recessed staple-shaped dogs D′, I may employ as an equivalent the construction represented in Fig. 6, where, pivoted in a recess in the side of each disk, so as not to interfere with the next abutting disk, is a pivoted spring-dog, *a*′, which engages with a shoulder or notch in the shaft A′, and by which the same mode of operation and result in resetting the disks would be accomplished, as will be easily comprehended.

I′ I′ are the index-wings arranged over each bank of disks, and with apertures extending in straight lines across the machine, through which but a single number upon each disk can be read.

My manner of keeping the register is as follows: The machine illustrated has eleven keys, numbered in a progressive series, 5, 10, 15, up to 55. The key marked 5 is the five-cent key. The key marked 10 is the ten-cent key, and so on. The registering-disks of the lower bank, which are operated directly by the keys, have upon them numbers from 0 to 29, inclusive, in a progressive series of 0,

1, 2, 3, &c. The disks of the upper bank have a corresponding number of figures, but in a series which are multiples of 30—as 0, 30, 60, 90, and so on. Upon the index-wings, just over the reading-apertures, are numbers to correspond with the numbers upon their coincident keys, as seen in Fig. 2. Now, the manner of ascertaining the cash taken in at the end of a day's work, or at any time, may be illustrated by reference to Fig. 2, where it is shown that the five-cent key has been operated twenty-nine times, the ten-cent key nine times, the fifteen-cent key once, and the twenty-cent key three times, and so on across the bank. In this illustration none of the disks in the upper bank have been moved from their zero-points, because none of the disks of the lower bank have as yet made a complete revolution. Supposing, however, that the five-cent key be now operated, its zero-mark would be brought under the reading-opening, its spur *p* would have turned the disk in the upper bank one notch, and 30 would be exposed under the reading-opening of the upper bank, and so on, as will be readily understood. As in the Ritty and Birch patent, a third or a fourth bank of disks might be added, if necessary. The cabinet is, of course, kept locked by the proprietor, who alone can inspect the machine to take off the readings and reset it.

230–232

Having thus fully described my invention, I claim—

1. In a cash-register, and in combination with the series of figures, disks arranged in two banks, a key-lever, and intervening mechanism for operating independently each disk of the lower bank, and the disks of the upper bank operated upon at predetermined intervals by the corresponding disks of the lower bank, the two parallel shafts for supporting the said upper and lower series of disks slotted and containing the spring-pressed pawls, one for each disk, whereby the disks of either or both series can be turned back to zero-point by a single rotation of its shaft, substantially as described, and for the purpose specified.

2. The combination of the independently-operating disks each having a notch on its inner periphery, the shaft having the longitudinal slot and the recesses for the springs, the staple-shaped pawls working in the slots of the shaft, and the springs located in the recesses in the shaft beneath the pawls and between their depending legs, substantially as described.

3. The combination of the wing V, the slotted arm W, the hammer *b*, the bell *g*, the trip-lever *g*, the link *i*, the arm *s*, and the vibrating frame P P R, with the operating-keys G and tablet-rods K, substantially as described, and for the purpose set forth.

CLINTON H. MALTBY.

Witnesses:
REBECCA RAMSEY.
SUMNER T. SMITH.

233 UNITED STATES PATENT OFFICE.

CLINTON H. MALTBY, of Dayton, Ohio, assignor to the National Cash Register Company, of same place.

Cash Register and Indicator.

Specification forming part of Letters Patent No. 321,989, dated July 14, 1885. Application filed January 2, 1885. (No model.)

To all whom it may concern:

Be it known that I, Clinton H. Maltby, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful improvements in cash registers and indicators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to an improvement in cash registers and indicators designed for the use of store-keepers and others as a means of accurately registering the total cash receipts for any given period of time—as for a day—and for indicating to the customers that the amount paid has been registered by disclosing to their view such amounts upon figured tablets.

Like the machine shown in patent No. 271,263, dated January 30, 1883, to Ritty and Birch, and like the machine described in my pending application, serial No. 106,983, filed September 21, 1883, upon both of which this is an improvement, the arrangement and operation of the parts is such that no tablet can be exhibited without its value being counted upon the registering mechanism, and whenever any tablet is disclosed it remains so until the machine is operated to disclose a second tablet.

The novelty consists in the construction, combination, and arrangement of the parts, as will be herewith set forth, and specifically claimed.

(Here follows diagram marked p. 232.)

In the accompanying drawings, figure 1 is a side elevation of my improved machine removed from its case. Fig. 2 is an interior side elevation showing the gong-operating mechanism and its connections. Fig. 3 is a detailed perspective view of a pair of disk-holding dogs. Fig. 4 is a partial plan view of one of the operating-keys. Fig. 5 is a detail view.

The same letters of reference are used to indicate identical parts in all the figures.

The general construction of the machine may be that of my application before referred to, and need not be described further than to say that A is the frame; B, the operating-keys journaled upon the shaft C; D, the vibrating frame, which is operated whenever any key is depressed; E, the tablet-rods; F, the tablet-supporting wing,

(No Model.)

C. H. MALTBY.

CASH REGISTER AND INDICATOR.

No. 321,988. Patented July 14, 1885.

Fig. 1.

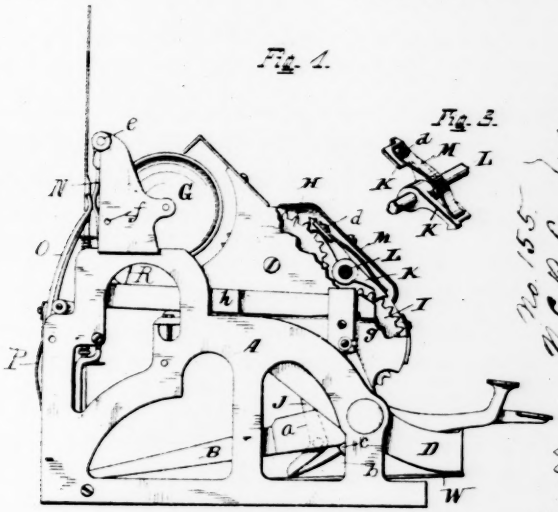


Fig. 3.

No. 155. U.C.R.C. Ex 232 Balt. C.M.C.

Fig. 5.

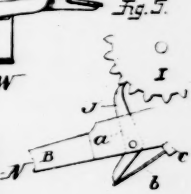
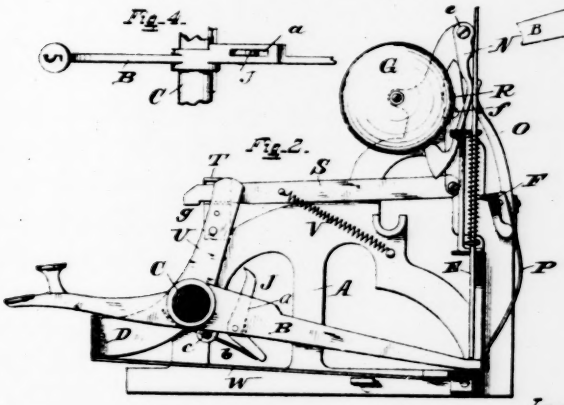


Fig. 4.

Fig. 2.



Witnesses:
Carl Spengel
C. W. Richardson

Inventor
Clinton H. Maltby
by Stetson Cook his Att'ys.

and G the bell or gong. H I are the sets of the double bank of registering-disks of the same construction as in my application before referred to, and adapted to be reset to their zero or starting point by a single revolution of their shafts.

The first feature of my invention consists in a spring, *b*, fastened at *c*, and bearing against the lower horizontal portion of a bell-cranked dog, J, one of which is pivoted in the slot *a* of each of the key-levers, and is adapted to engage with the teeth of the spur-disks I to turn the same one notch when the key is operated. By this construction the dogs are held from lateral play, and their true and constant engagement with the disks I is the more effectually insured.

The second feature of my invention consists in the holding-dogs for both pairs of disks. These holding-dogs K are strung in pairs upon a single shaft, L, as seen in Figs. 1 and 3, and each pair is held in constant engagement with the teeth or notches of the disks by a single spring, M, which is fastened, as at *d*, to the extremity of one of the dogs, and bears at its opposite end upon the extremity of the other dog, thus enabling me to simplify and cheapen the construction by having a single spring for each pair of dogs. At the same time each dog can vibrate independently of the other as the action of the machine requires.

The third feature of my invention consists in the gong-hammer tripping mechanism, and will be readily understood by reference to Figs. 1 and 2, where N is the hammer, pivoted at *e*, and against which bears an arm, O, extending from the wing F, and held under spring-pressure by the spring P, which controls the action of both the wing and hammer. R is a lever-arm pivoted at *f*, with its upper end bearing against the hammer N, and having pivoted to its lower end a latch-bar, S, passing through a recess in a plate, T, adjustably secured to the upward extension U of the vibrating frame D. This latch-arm is provided with an engaging-shoulder, *g*, as shown. V is any suitable spring for holding the latch-arm down in engagement with the lower wall of the recess in the plate T. Whenever the frame D is depressed by the operation of any of the keys,
234–238 the latch-arm S is thrown forward, thereby throwing back the hammer N and wing F until the forward tilting of the arm U and plate T has raised the shoulder *g* out of engagement with the plate T, whereupon the retraction of the spring P would throw the wing F in and cause the hammer to strike the gong. This release of the arm S would only take place when the key had been depressed to its farthest limit, and by means of the adjustability of the plate T this could always be insured and the wear of the parts be taken up. The latch-arm S is provided with any suitable stop, *h*, which, coming in contact with the frame of the machine, would limit the forward play of the arm and prevent its going so far forward as to become disengaged from the plate T. The return of the frame D by means of the springs W would cause the re-engagement of the shoulder *g* with the plate T, as will be readily understood.

Having thus fully described my invention, I claim—

1. The combination, in a cash registering and indicating machine

having a disk, I, provided with teeth, of keys B, arranged as described, and provided with slots, in which are pivoted the vertical portions of bell-crank dogs, having the horizontal portions, each of which depends below the key, and springs *b*, secured to the under side of each key, and having their free ends bearing against said lower portion of the dog, thereby holding the same in engagement with the teeth of the disk I and preventing lateral play of the dog in said slot, substantially as set forth.

2. The combination, in a cash registering and indicating apparatus, having the disks H I, of the shaft L, the holding-dogs strung in pairs upon said single shaft L, and extending in different directions, as described, a spring for each pair of dogs secured to one of the same and having its free end bearing on the other dog, substantially as set forth.

3. The combination, in a cash registering and indicating apparatus, of a series of keys, a frame, D, adapted to be vibrated by any one of said keys, a gong and operating mechanism therefor, and wing mechanism, latch-arm S, provided at its outer end with a shoulder, *g*, and a plate, T, to guide and retain said latch, substantially as set forth.

CLINTON H. MALTBY.

Witnesses:
WILLIAM B. SULLIVAN.
HENRY THEOBALD, JR.

(No Model.) 2 Sheets—Sheet 2.

F. J. PATTERSON, I. P. DAVIS & A. HERRMAN.

CASH REGISTER AND INDICATOR.

No. 351,460. Patented Oct. 26, 1886.

Fig. 3

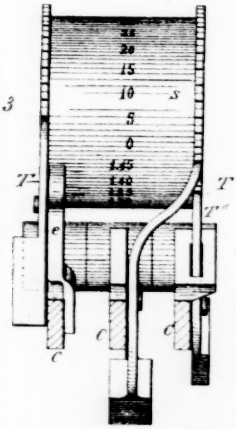


Fig. 2.

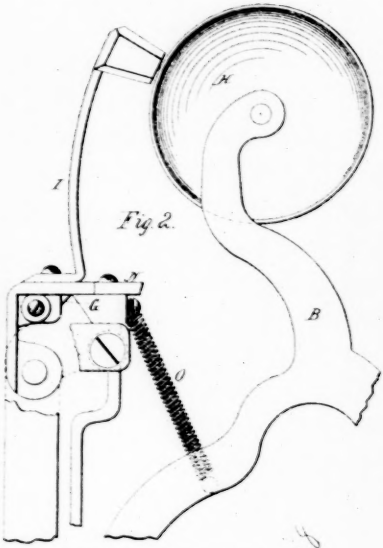
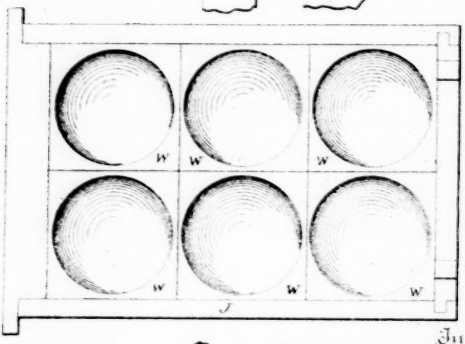


Fig. 4.



No. 155,
M. & P. Co.
A. 23
B. 2

Witnesses
W. C. Tirdinston
E. C. Rector

Inventors
Frank J. Patterson, Isaac P. Davis
and A. Herrman
By their Attorneys
Munn & Co

(No Model.) 2 Sheets—Sheet 1.

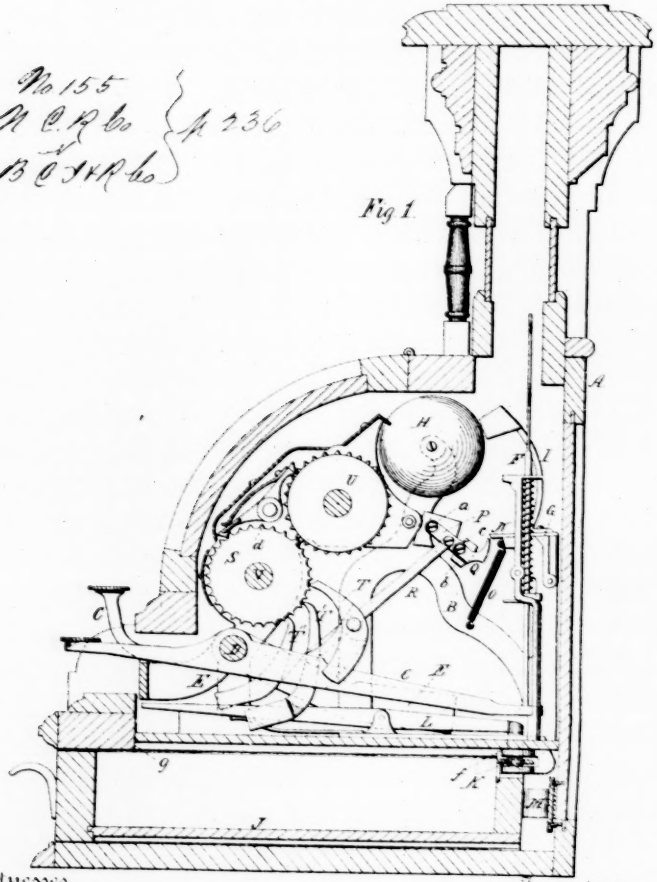
F. J. PATTERSON, I. P. DAVIS & A. HERRMAN.

CASH REGISTER AND INDICATOR.

No. 351,460. Patented Oct. 26, 1886.

No 155
N C R Co } p 136
B C R Co

Fig 1.



Witnesses
W. C. Tirdinston.
E. W. Rector

Inventors
Frank J. Patterson Isaac P. Davis,
and A. Herrman
By their Attorneys
Stewart & Peck

239 UNITED STATES PATENT OFFICE.

FRANK J. PATTERSON, ISAAC P. DAVIS, and AL HERRMAN, of Dayton, Ohio, assignors to the National Cash Register Company, of same place.

Cash Register and Indicator.

Specification forming part of Letters Patent No. 351,460, dated October 26, 1886. Application filed April 1, 1886. Serial No. 197,461. (No model.)

To all whom it may concern:

Be it known that we, Frank J. Patterson, Isaac P. Davis, and Al Herrman, all citizens of the United States, and residing at Dayton, in the county of Montgomery, and State of Ohio, have jointly invented certain new and useful improvements in cash registers and indicators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Our invention relates to improvements in cash registers and indicators, designed for the use of store-keepers and others, as a means of accurately registering the total receipts for any given period of time—as a day, for instance—and for indicating to the customers that the amount paid has been registered by disclosing to their view such amount upon figured tablets.

The novelty of our invention will be herein set forth, and distinctly pointed out in the claims.

(Here follow diagrams marked pp. 236 & 238.)

In the accompanying drawings, figure 1 is a sectional side elevation of a cash register and indicator embodying our present invention. Fig. 2 is an enlarged detail view, with portions broken away, showing the gong-hammer, gong, and wing-retracting mechanism. Fig. 3 is an enlarged rear elevation of one of the registering-wheels and its three operating-keys in section. Fig. 4 is a plan view of the spring-projected drawer or till.

The same letters of reference are used to indicate identical parts in all the figures.

The object of the present machine is to indicate to the purchaser upon a figured tablet the amount of the sale by operating the proper key, and at the same time to sound an alarm and release the money drawer or till, which is partially projected from the case, while the same operation of the key also insures the registration of the amount paid in by revolving figured wheels a certain distance, which wheels may be in banks, and so connected that one complete revolution of the lower bank turns the corresponding wheel of the next bank one notch.

Referring to the drawings, it is sufficient here to say that A is the case; B, the frame-work supporting the mechanism within the case;

C, the operating-keys journaled upon the shaft D; E, the vibrating frame, which is operated whenever any key is depressed; F, the tablet-rods; H, the bell or gong; I, the gong-hammer secured to the wing G; J, the money drawer or till located in the lower part of the case A, and which, when shut, is held locked by the bolt K, and when unlocked by the depression of the bolt lever L is projected by the spring M.

By reference to Figs. 1 and 2, the first feature of our invention may be thus explained. Upon the end of the wing G next the gong is a forwardly-projecting plate, N, with a beveled or knife edge. A spring, O, secured at its upper end to the wing, or a projection thereof, and at its lower end to the frame, serves to retract the wing and cause the hammer to strike the gong, or weights may be employed, as in serial No. 182,808, of J. Ritty.

Pivoted to the frame B, on the side next the gong, as at *a*, is an arm, P, carrying loosely pivoted thereto a toggle-piece or wiper-block, Q, which is held up in alignment with the arm P by a shoulder or stop, *b*, and is prevented from being thrown up out of operating position by a second shoulder or stop, *c*. The arm P has pivoted to it a bar or link, R, whose lower end is pivoted to the vibrating frame E in such manner that when the frame E is vibrated the arm P will be raised and the beveled or rounded face of the wiper-block will come in contact with the plate N, thereby pressing back the wing and bell-hammer until the wiper-block having passed above the plate N, the spring O, or weight, if used, retracts the wing and hammer, thereby holding the tablet exposed and sounding the alarm. The wiper-block, by the retraction of the vibrating frame and arm P, is drawn back, and owing to its joint with the arm P passes the plate N and resumes its normal position by its gravity, as will be readily understood.

The next feature of our invention is best illustrated in Figs. 1 and 3. Heretofore in "wheel-machines," so called, there has been one registering wheel of a bank to each key. We now seek to simplify the construction by grouping the keys into a series of three to one wheel, or two to one wheel, or in the same machine to have groups of both three, two, and one keys to each wheel, respectively. This we do in the following manner: Each wheel S of the lower bank has at each end as many projections or teeth *d* as there are figured spaces around the wheel. This wheel is as wide as the group of keys by which it is to be operated, and by pivoting the gravitating dogs T, T′, and T″ to the keys at varying distances from the center of vibration D of each key, and by bending the middle one, T′, as seen in Fig. 3, to engage with the teeth on either side of the wheel, the wheel will be turned the required distance to correctly register the value of the key operated. For instance, the dog T″ is pivoted to the five cent key and is nearest the fulcrum D. It is so adjusted that by operating that key to its farthest limit the wheel is turned only one notch. The next dog, T′, is pivoted to the ten-cent key at such a distance from the fulcrum that by operating that key to its farthest limit the wheel is turned

240–248

two notches. The next dog, T, is pivoted to the fifteen-cent key, or to an upward extension, *e*, of said key, at such a distance from the fulcrum that by operating that key to its farthest limit the wheel is turned three notches.

In operating any key it will be seen that the dogs of the other keys of that wheel become mere overriders, and act as stops to prevent the retraction of the wheel upon the release of the key operated. It will be further observed that the extent of vibration of all the keys is the same, and the extent of turning of the registering-wheel is determined by the distance of the operating-dog from the axis of vibration of the key or its fulcrum. In this illustration of the first registering disk or wheel, S, there are thirty teeth on each side, and thirty corresponding numbered spaces in a series of 0, 5, 10, 15, and so on to $1.45. In the corresponding wheel, U, of the bank above the series would begin with $1.50 and continue in a series $3, $4.50, $6, and so on. It will be readily understood that as many independent wheels S may be placed side by side upon the shaft as are required to suit the number of keys in a machine, and the grouping of these keys may be in twos or threes, as desired.

We provide the till J with a nest of bowls, W, for the more ready removal of the money, especially where coin is largely used, and where it is desirable that the drawer should be permanently connected to the machine, as is frequently the case. The drawer is provided with stops *f* at its rear, which, coming in contact with a shoulder, *g*, at the front of the case, prevent the removal or disconnection of the drawer without preventing it from being drawn nearly out. The bowls W can be separately removed and their contents emptied into the proprietor's pocket or other receptacle, after which, having read off the totals represented by the wheels S, he could retire to his private room and ascertain if the cash tallied with the reading by counting it. It is evident that the entire drawer may be fitted with bowls W, or any portion of it which may be divided off for that purpose.

Having thus fully described our invention, we claim—

1. The combination, with the vibrating tablet, supporting-wing, and gong-hammer secured thereto, of the series of operating-keys, a vibrating frame operated by depressing any of said keys, a vibrating arm, P, connected to and operated by said vibrating frame, and a wiper-block pivoted to said arm P, and a projecting plate, N, upon the wing, in close proximity to the wiper-block, whereby the upper play of the arm P causes the operation of the wing and sounding of the gong-ha nmer, and the return-stroke of the arm P brings back the wiper-block to its normal operating position, substantially as described.

2. The combination, in a cash-register, of a transverse shaft, a series of keys mounted thereon and representing various values, a registering-wheel provided with a progressive series of characters corresponding with those represented by the keys, and located immediately above the series of keys, a gear-wheel located on the wheel, and a

dog located on each key and engaging said gear-wheel, the dog of each key being located at a distance from the shaft D, to secure a leverage sufficient to effect a rotation of the cylinder proportionate with the value of the particular key operated, the dogs of the several keys being bent so as to all engage the gear-wheel in the same vertical plane, substantially as set forth.

FRANK J. PATTERSON.
ISAAC P. DAVIS.
AL HERRMAN.

Witnesses:

WILLIAM B. SULLIVAN.
HENRY MEYER.

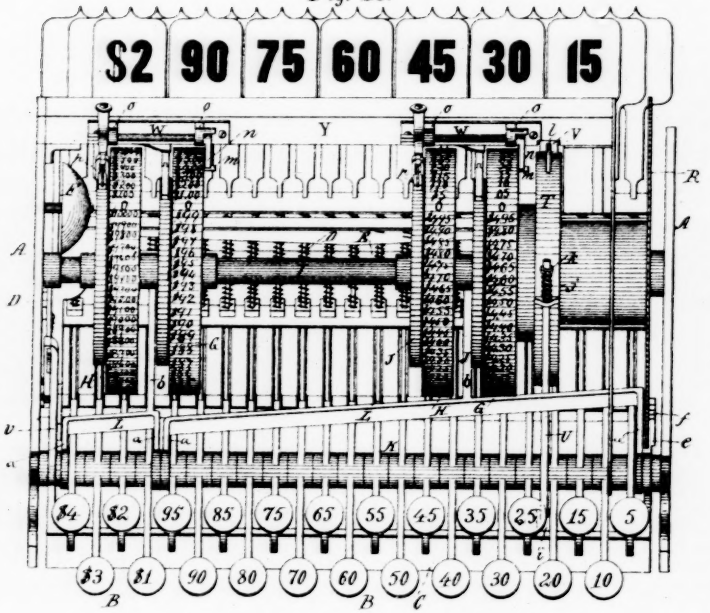
(No Model.) 4 Sheets—Sheet 4.

J. H. PATTERSON.

CASH INDICATOR AND REGISTER.

No. 382,552. Patented May 8, 1888.

Fig. 10.



No 155
N.C.R.Co.
to 24 A
O.C.I.R.C.

Witnesses:
W. C. Tirdinston.
Charles Billow.

Inventor:
John H. Patterson,
by Peck & Peck.
his Attorneys.

(No Model.) 4 Sheets—Sheet 3.

J. H. PATTERSON.

CASH INDICATOR AND REGISTER.

No. 382,552. Patented May 8, 1888.

Fig. 8.

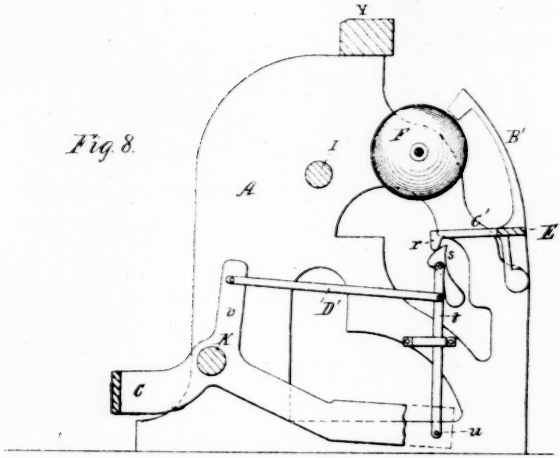
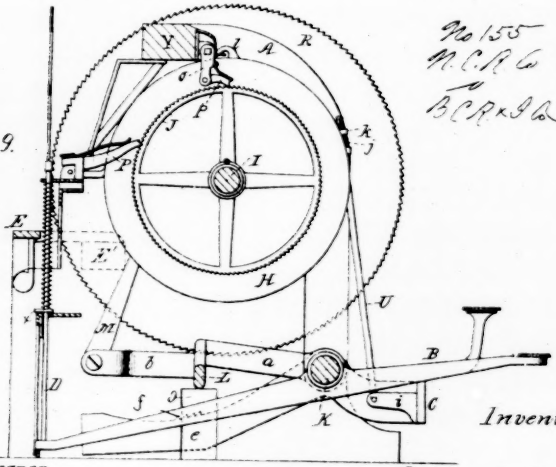


Fig. 9.



No 155
N.C.R.Co
B.C.R.Co
} p. 496

Inventor.

Witnesses.
W. C. Tirdinston.
Charles Billow.

John H. Patterson.
by Peck & Peckar
his Attorneys.

(No Model.) 4 Sheets—Sheet 2.

J. H. PATTERSON.

CASH INDICATOR AND REGISTER.

No. 382,552. Patented May 8, 1888.

Fig. 4.

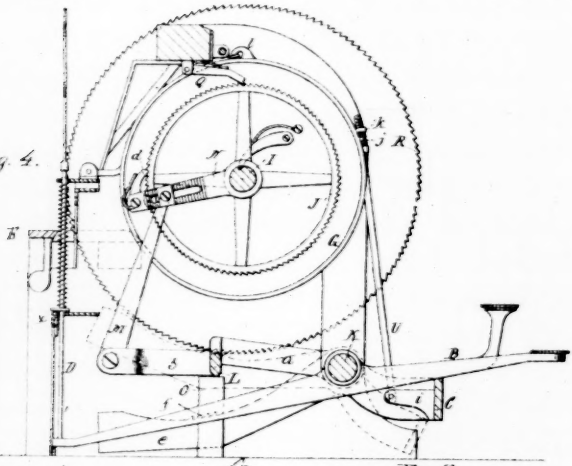


Fig. 5.

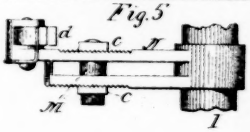


Fig. 6.

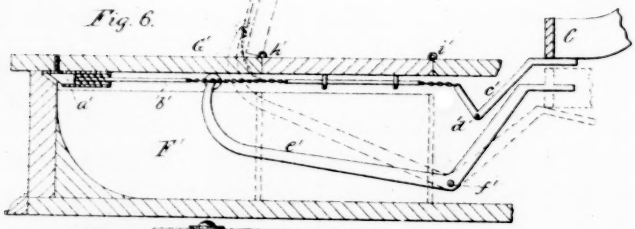
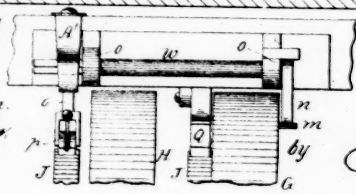


Fig. 7.



Witnesses:
W. G. Tirdinston.
Charles B. Allen.

Inventor.
John H. Patterson
Peck & Rector
his Attorneys.

(No Model.) 4 Sheets—Sheet 1.

J. H. PATTERSON.

CASH INDICATOR AND REGISTER.

No. 382,552. Patented May 8, 1888.

Fig. 1.

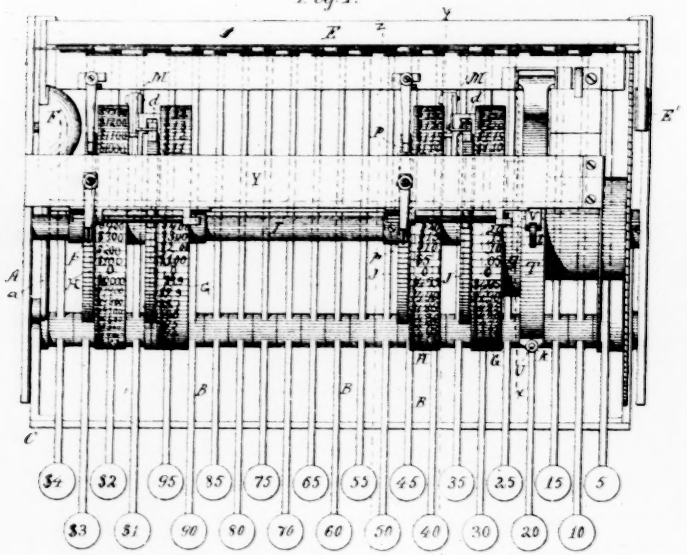


Fig. 2.

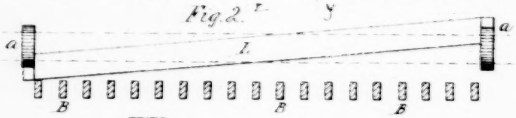
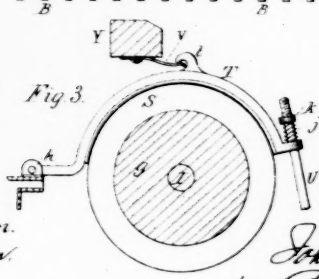


Fig. 3.



No 155
N.C.R.C.
B.C.J.&R.C.

Witnesses:
W. C. Jirdinston.
Charles Bellow.

Inventor.
John H. Patterson.
by Peck & Rector.
his Attorneys.

249 UNITED STATES PATENT OFFICE.

JOHN H. PATTERSON, of Dayton, Ohio.

Cash Indicator and Register.

Specification forming part of Letters Patent No. 382,552, dated May 8, 1888. Application filed January 24, 1887. Serial No. 225,252. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. PATTERSON, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful improvements in cash registers and indicators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an improvement in cash registers and indicators designed for the use of store-keepers and others as a means of accurately registering the total cash receipts for any given period of time—as a day, for instance—and for indicating to the customers that the amount paid has been registered by disclosing to their view such amounts upon figured tablets. Like the machine shown in patent No. 271,363 to Ritty and Birch, the arrangement and operation of the parts are such that no tablet can be exhibited without its value being counted upon the registering mechanism, and whenever any tablet is disclosed it remains so until the machine is operated to disclose a second tablet.

My present invention has for its object the simplification of the registering mechanism, as well as the increased efficiency of the machine, and its novelty will be herein set forth, and specifically pointed out in the claims.

(Here follow diagrams marked pp. 242, 244, 246, & 248.)

In the accompanying drawings, figure 1 is a plan view of a machine embodying my invention with the casing removed. Fig. 2 is a front elevation in detail of the inclined bar for actuating the registering mechanism. Fig. 3 is a sectional detail in end elevation through the dotted line *x x* of Fig. 1. Fig. 4 is a sectional end elevation of the machine through the dotted line *y y* of Fig. 1. Fig. 5 is an enlarged detail plan view of the coupling-crank and its dog. Fig. 6 is a sectional side elevation of the till and its mechanism. Fig. 7 is an enlarged front elevation in detail of the mechanism for communicating motion from one registering-wheel to the next. Fig. 8 is a sectional end elevation of the machine, showing the gong and wing actuating mechanisms. Fig. 9 is a sectional end elevation of the machine through the dotted lines *z z* of Fig. 1. Fig. 10 is a top view of the machine with the casing removed, looking in the direction of the arrow, Fig. 4.

The same letters of reference are used to indicate identical parts in all the figures.

The frame-work, casing, and general construction of the machine are substantially the same as those of the Ritty and Birch patent, No. 271,363, of January 30, 1883, with the exceptions to be hereinafter pointed out; and it is sufficient here to say that A is the frame-work; B, the keys of fixed values; C, the vibrating frame; D, the tablet-rods; E, the supporting wing for the tablet-rods, and F the gong.

In this instance I have provided two sets of keys, the first representing cents in a series of five, ten, fifteen, and so on up to ninety-five, and the second set representing dollars in a series of one, two, three, and so on up as high as may be desired. There are but two registering-wheels, G H, for each of these sets. These wheels are loosely journaled upon a shaft, I, which is in turn journaled in the frame-work above and transversely of the keys. The first of these wheels is numbered upon its periphery in a series of 0, 5, 10, and so on up to $4.95, while the second is numbered in a series from 0, $5, $10, and so on up to $495. Secured to each of the wheels G H, at their sides, is a ratchet-wheel, J, having as many teeth as there are rows of numbers upon the wheels. Hung loosely upon the key-shaft K by arms *a* are in this instance two inclined bars, L, each extending over one set of keys and free to be vibrated independently of each other. The inclination of these bars is with reference to the line of the keys when in their normal position of rest—that is to say, the bar may rest directly upon the ninety-five-cent key, while it is some distance from the five-cent key, as seen in Fig. 2, the keys being indicated in Fig. 10. As the keys all have the same limit of play or stroke, the purpose of this inclination will presently be apparent.

Each bar L has a rearwardly-extending arm, *b*, to which is pivoted an upwardly extending bar, M, adjustably pivoted by means of serrated nuts *c* to a slotted crank-arm, N, loosely hung upon the shaft I, and having its sides serrated, as shown more particularly in Fig. 5. Pivoted upon the outer end of the crank-arm N is a spring-dog, *d*, constantly engaging with the ratchet-wheel J of the register-wheel G. Stops O, made adjustable, if desired, support the bars L when down in their normal position of rest.

P Q are spring check-dogs pivoted to the main frame and engaging with the ratchets J, as seen in Figs. 4 and 9, to serve as brakes and prevent the returning of the register-wheels, as will be readily understood.

The first or five-cent key is, as before stated, at such distance from frame L that the latter will not be touched by it until just before the key reaches the limit of its motion. Consequently the frame will be operated through the distance of one tooth of the registering-wheel, while the ninety-five-cent bar being in contact with bar L when this key is operated the bar begins to move immediately, and upon the completion of the key's excursion will have moved the pawl over nineteen of the registering teeth. The same general

relation is maintained with relation to the dollar or tens series of keys, the highest-numbered key being in contact with L, while the lowest numbered is arranged to nearly complete its movement when the frame is operated, and the intermediate keys arranged with relation to the bar at proportional distances, depending upon their values. The tablet-spindles are arranged to be operated from the ends of the keys and supported upon a wing in the manner common in this class of machines, and the gong-sounding apparatus is operated from the frame C in a manner to be farther on described, and at present it is only necessary to state that for every movement of the frame C the bell is sounded. The details will be farther on described. It results from this construction and the adjustment of the parts that when the ninety-five-cent key is operated to its fullest extent to expose its tablet and sound the gong the inclined bar L will be raised to its farthest extent, or a distance just sufficient to turn the ratchet-wheel and its register-wheel G nineteen notches through the medium of the arms *b*, M, and N and dog *d*, and thus, supposing the register-wheels to have shown 0 under their reading-openings, expose the number 95 through the reading-opening of the wheel G. The weight of the parts is sufficient to retract the bar L when the key is released. Now, should the five-cent key be operated to its farthest limit, thereby exposing its tablet and sounding the gong, the bar L would only be raised just sufficiently to turn the ratchet-wheel of the register-wheel G one notch, and $1.00 would appear under the reading-opening, and so on, each key serving to elevate the bar just sufficiently to turn the ratchet-wheel as many notches as the value of said key divided by five would represent.

While I have shown the inclined bars located above the keys, it is of course apparent that they might be under the keys, in which event the keys would be provided with hooks extending down so as to engage with the under side of the bars, as will be readily understood.

Although an inclined bar has been described, it will be understood not to necessarily apply to a bar constructed the same width or thickness its entire length; but it is only essential that the lower side, or the one acted upon by the key-levers, be inclined.

To prevent the sudden and violent operation of the keys from throwing the register-wheels farther forward than the exact number of notches requisite, I have shown two forms of brake mechanism, either or both of which may be employed, as may be desired or found necessary. The first and most positive of these is a large ratchet-wheel, R, Figs. 1 and 4, keyed or otherwise secured to a hub upon the register-wheel G and turning therewith. It is of such size and so located that when the vibrating frame C has been fully depressed the weighted end *e* of said frame, which has serrations *f* upon its upper side, comes in contact with said wheel R and positively stops the same by the serrations engaging with the ratchets, as seen by the dotted lines in Fig. 4.

The other form of brake is more particularly shown in Fig. 3, where S represents a brake-wheel upon the hub *g* of the register-wheel.

T is a brake-shoe pivoted, as at *h*, to the frame extending over said brake-wheel, and connected by a rod, U, to an arm, *i*, upon the forward part of the vibrating frame. The connection between the rod U and brake-shoe is obtained by a spring, *j*, and nut *k*, as seen in Fig. 3, the rod passing freely through an opening in the flanged end of the shoe.

V is a retracting-spring, which, engaging with a hook, *l*, upon the brake-shoe, serves to hold the shoe up away from the wheel, except when a key is being operated, by which action the shoe is brought down upon and brakes the wheel S.

To cause the turning of the register-wheel H one notch for every complete revolution of the wheel G, I have provided the mechanism shown in Figs. 1, 7, and 9, where the wheel G has upon one side a projecting pin or stud, *m*, which at every complete revolution of said wheel strikes and vibrates an arm, *n*, upon the end of a rock-shaft, W, journaled in blocks *o* upon the cross-bar Y of the main frame. The opposite end of this rock-shaft is provided with an arm carrying a pivoted spring-dog, *p*, engaging with the ratchet-wheel J of the register-wheel H. The extent of vibration of the arm *n* is so adjusted that the rock-shaft is turned just sufficiently to cause the dog *p* to turn the ratchet J one notch.

A′ is a resetting spring bearing upon the arm *o*, to cause the resetting of the dog, as will be readily understood.

The operation of frame C and tablets will be readily understood by reference to the drawings by those skilled in the art to
251 which this specification is addressed. When any of the keys are operated, the under side engaging with the frame C causes its vibration and the operation of the gong-sounding apparatus, as hereinafter described, while the end of the key lifts the appropriate tablet-spindle and causes the projection *x* thereon to become engaged by the wing E and to be held until released by the device about to be described operating from the frame C.

Another feature of my invention, which relates to the tripping mechanism of the tablet-supporting wing and gong-hammer, is shown in Fig. 8, where the wing E carries at its end next the gong a hammer, B′, and an extension, C′, having at its end a pendent rounded or beveled nose, *r*, with which engages a dog, *s*, pivoted to an arm, *t*, whose lower end is pivoted, as at *u*, to the frame. The dog *s* is free to vibrate forward, but not backward, and its engaging surface is rounded or beveled, as shown.

D′ is the draw-bar, connecting the arm *t* with the arm *v* of the vibrating frame.

By this construction whenever a key is operated the tilting of the vibrating frame draws forward the dog *s*, raises the extension C′, and throws back the wing to permit the passage of the tablet-rod, and the adjustment of the parts is such that just as the key has about reached its farthest limit of depression the dog *s* has passed the nose *r*, whereupon the weight E′ (see dotted lines, Fig. 9) or a spring resets the wing and causes the hammer to strike the gong. The release of the key and retraction of the vibrating frame resets the dog *s*, which passes freely back under and re-engages with the nose *r*.

The remaining feature of my invention is illustrated in Fig. 6, where the case of the machine is extended outward to form a till-compartment, F′, with a hinged lid or cover, G′. This lid is held locked by a spring-bolt, a', on its under side, actuated by a draw-rod, b', connected to a bell-crank arm, c', pivoted, as at d', and having a lip extending under the vibrating frame C in such manner that the first movement of the frame when a key is operated vibrates the bell-crank c' and draws back the bolt. Other arms, e', pivoted, as at f', and carrying rollers g', which bear upon the under side of the lid, are so arranged that the further depression of the frame C under the action of the key causes the lid to be opened and thrown up, as seen by the dotted lines. If desired, the lid may be hinged both at h' and i', thus forming a double-hinged lid. The arms e' are preferably at each side of the till-compartment, and the draw-bar of the bolt is made flexible by link-connections, as shown, or in any other suitable manner.

Having thus fully described my invention, I claim—

1. In a cash register and indicator, the combination, with a series of keys of fixed values and a registering-wheel, of a bar located transversely across and inclined relatively to the plane of the keys, and connecting mechanism between said bar and registering-wheel, whereby the operation of any key causes its value to be registered on said registering-wheel, substantially as described.

2. In a cash register and indicator, the combination, with a series of keys of fixed values and a registering-wheel, of a bar extending transversely across the keys and having a vertically-inclined operating side, and connecting mechanism between said bar and registering-wheel, whereby the operation of any key causes its value to be registered on said registering-wheel, substantially as described.

3. In a cash register and indicator, the combination, with a series of keys of fixed values and a registering-wheel provided with a ratchet, of a bar located transversely across and inclined relatively to the plane of the keys, and a pawl actuated by said bar and engaging with the ratchet of the registering-wheel, whereby the operation of any key causes its value to be registered on said registering-wheel, substantially as described.

4. In a cash register and indicator, the combination, with a series of keys of fixed values and a registering-wheel provided with a ratchet, of a bar extending transversely across the keys and having a vertically-inclined operating side, and a pawl actuated by said bar and engaging with the ratchet of the registering-wheel, whereby the operation of any key causes its value to be registered on said registering-wheel, substantially as described.

5. In a cash register and indicator, the combination, with a series of keys of fixed values and a registering-wheel, of a bar located transversely across the keys and inclined relatively to the plane of the keys, and connecting mechanism between said bar and registering-wheel, and brake mechanism applied to said registering-wheel, whereby the operation of any key causes its value to be registered on said registering-wheel, substantially as described.

6. In a cash register and indicator, the combination, with a series

of keys of fixed values and a registering-wheel, of a bar extending transversely across the keys and having a vertically-inclined operating side, connecting mechanism between said bar and registering-wheel, and brake mechanism applied to said registering-wheel, whereby the operation of any key causes its value to be registered on said registering-wheel, substantially as described.

7. In a cash register and indicator, the combination, with a series of keys of fixed values and a registering-wheel provided with a ratchet, of a bar located transversely across the keys and inclined relatively to the plane of the keys, a pawl actuated by said bar and engaging with the ratchet of the registering-wheel, and brake mechanism applied to said registering-wheel, whereby the operation of any key causes its value to be registered on said registering-wheel, substantially as described.

252 8. In a cash register and indicator, the combination, with a series of keys of fixed values and a registering-wheel provided with a ratchet, of a bar extending transversely across the keys and having a vertically-inclined operating side, a pawl actuated by said bar and engaging with the ratchet of the registering wheel, and brake mechanism applied to said registering-wheel, whereby the operation of any key causes its value to be registered on said registering-wheel, substantially as described.

9. In a cash register and indicator, the combination, with a series of keys of fixed values pivoted upon horizontal axes and a registering-wheel, of a bar extending transversely across the keys, with which the latter engage when moved on their pivots, the portions of said bar with which the different keys engage being arranged at different distances from said keys, and connecting mechanism between said bar and registering-wheel, substantially as described.

10. In a cash register and indicator, the combination, with a series of keys of fixed values, a series of tablet-rods and tablets actuated by said keys for exposing to view the value of any key operated, and a registering-wheel, of a bar located transversely across and inclined relatively to the plane of the keys, and connecting mechanism between said bar and registering-wheel, whereby the operation of any key causes its tablet to be exposed to view and registers its value on said registering-wheel, substantially as described.

11. In a cash register and indicator, the combination, with a series of keys of fixed values, a series of tablet-rods and tablets actuated by said keys for exposing to view the value of any key operated, and a registering-wheel, of a bar having a vertically-inclined operating side located transversely across the keys and connecting mechanism between said bar and registering-wheel, whereby the operation of any key causes its tablet to be exposed to view and registers its value on said registering-wheel, substantially as described.

12. In a cash register and indicator, the combination, with a series of keys of fixed values, a series of tablet-rods and tablets actuated by said keys for exposing to view the value of any key operated, and a registering-wheel provided with a ratchet, of a bar located transversely across and inclined relatively to the plane of the keys, and a pawl actuated by said bar and engaging with the ratchet of the

registering-wheel, whereby the operation of any key causes its tablet to be exposed to view and registers its value on said registering-wheel, substantially as described.

13. In a cash register and indicator, the combination, with a series of keys of fixed values, a series of tablet-rods and tablets actuated by said keys for exposing to view the value of any key operated, and a registering-wheel provided with a ratchet, of a bar extending transversely across the keys and having a vertically-arranged operating side, and a pawl actuated by said bar and engaging with the ratchet of the registering-wheel, whereby the operation of any key causes its tablet to be exposed to view and registers its value on said registering-wheel, substantially as described.

14. In a cash register and indicator, the combination, with a series of keys of fixed values, a series of tablet-rods and tablets actuated by said keys for exposing to view the value of any key operated, and a registering-wheel, of a bar located transversely across and inclined relatively to the plane of the keys, connecting mechanism between said bar and registering-wheel, and brake mechanism applied to said registering-wheel, whereby the operation of any key causes its tablet to be exposed to view and registers its value on said registering-wheel, substantially as described.

15. In a cash register and indicator, the combination, with a series of keys of fixed values, a series of tablet-rods and tablets actuated by said keys for exposing to view the value of any key operated, and a registering-wheel, of a bar extending transversely across the keys and having a vertically-inclined operating side, connecting mechanism between said bar and registering-wheel, and brake mechanism applied to said registering-wheel, whereby the operation of any key causes its tablet to be exposed to view and its value to be registered on said registering-wheel, substantially as described.

16. In a cash register and indicator, the combination, with a series of keys of fixed values, a series of tablet-rods and tablets actuated by said keys for exposing to view the value of any key operated, and a registering-wheel provided with a ratchet, of a bar located transversely across and inclined relatively to the plane of the keys, a pawl actuated by said bar and engaging with the ratchet of the registering-wheel, and brake mechanism applied to said registering-wheel, whereby the operation of any key causes its tablet to be exposed to view and registers its value on said registering-wheel, substantially as described.

17. In a cash register and indicator, the combination, with a series of keys of fixed values, a series of tablet-rods and tablets actuated by said keys for exposing to view the value of any key operated, and a registering-wheel provided with a ratchet, of a bar extending transversely across the keys and having a vertically-inclined operating side, a pawl actuated by said bar and engaging with the ratchet of the registering-wheel, and brake mechanism applied to said registering-wheel, whereby the operation of any key causes its tablet to be exposed to view and registers its value on said registering-wheel, substantially as described.

18. In a cash register and indicator, the combination, with a series

of keys of fixed values pivoted upon horizontal axes, a series of tablet-rods and tablets actuated by said keys for exposing to view the value of any key operated, and a registering-wheel, of a bar extending transversely across the keys, with which the latter
253 engage when moved on their pivots, the portions of said bar with which the different keys engage being arranged at different distances from said keys, and connecting mechanism between said bar and registering-wheel, whereby the operation of any key causes its tablet to be exposed to view and registers its value on said registering-wheel, substantially as described.

19. In a cash register and indicator, the combination, with a series of keys of fixed values pivoted upon horizontal axes, a series of tablet-rods and tablets actuated by said keys for exposing to view the value of any key operated, and a registering-wheel provided with a ratchet, of a bar extending transversely across the keys, with which the latter engage when moved on their pivots, the portions of said bar with which the different keys engage being arranged at different distances from said keys, and a pawl actuated by said bar and engaging with the ratchet of the registering-wheel, whereby the operation of any key causes its tablet to be exposed to view and registers its value on said registering-wheel, substantially as described.

20. In a cash register and indicator, the combination of a set of keys indicating cents, a wheel registering cents, a bar located transversely across and inclined relatively to the plane of said keys, connecting mechanism between said bar and registering-wheel, a set of keys indicating dollars, a wheel registering dollars, a bar located transversely across and inclined relatively to the plane of said dollar-keys, and connecting mechanism between said bar and dollar-registering wheel, whereby upon operating any key indicating cents its value is registered on the cent-registering wheel, and whereby upon operating any key indicating dollars its value is registered on the dollar-registering wheel, substantially as described.

21. In a cash register and indicator, the combination of a set of keys indicating cents, a wheel registering cents, a bar extending transversely across said keys and having a vertically-inclined operating side, connecting mechanism between said bar and registering-wheel, a set of keys indicating dollars, a wheel registering dollars, a bar extending transversely across said dollar-keys and having a vertically-inclined operating side, and connecting mechanism between said bar and dollar-registering wheel, substantially as and for the purpose described.

22. In a cash register and indicator, the combination of a set of keys indicating cents, a wheel registering cents and provided with a ratchet, a bar located transversely across and inclined relatively to the plane of said keys, a pawl actuated by said bar and engaging with the ratchet of said registering-wheel, a set of keys indicating dollars, a wheel registering dollars and provided with a ratchet, a bar located transversely across and inclined relatively to the plane of said dollar-keys, and a pawl actuated by said bar and engaging

with the ratchet of the dollar-registering wheel, substantially as and for the purpose described.

23. In a cash register and indicator, the combination of a set of keys indicating cents, a wheel registering cents and provided with a ratchet, a bar extending transversely across said keys and having a vertically-inclined operating side, a pawl actuated by said bar and engaging with the ratchet of said registering-wheel, a set of keys indicating dollars, a wheel registering dollars and provided with a ratchet, a bar extending transversely across said dollar-keys and having a vertically-inclined lower side, and a pawl actuated by said bar and engaging with the ratchet of the dollar-registering wheel, substantially as and for the purpose specified.

24. In a cash register and indicator, the combination of a set of keys indicating cents, a set of tablet-rods and tablets corresponding in value to said keys and actuated thereby, a wheel registering cents, a bar located transversely across and inclined relatively to the plane of said keys, connecting mechanism between said bar and registering-wheel, a set of keys indicating dollars, a set of tablet-rods and tablets corresponding in value to said dollar-keys and actuated thereby, a wheel registering dollars, a bar located transversely across and inclined relatively to the plane of said dollar-keys, and connecting mechanism between said bar and dollar-registering wheel, substantially as and for the purpose described.

25. In a cash register and indicator, the combination of a set of keys indicating cents, a set of tablet-rods and tablets corresponding in value to said keys and actuated thereby, a wheel registering cents, a bar extending transversely across said keys and having a vertically-arranged operating side, connecting mechanism between said bar and registering-wheel, a set of keys indicating dollars, a set of tablet-rods and tablets corresponding in value to said keys and actuated thereby, a wheel registering dollars, a bar extending transversely across said dollar-keys and having a vertically-inclined operating side, and connecting mechanism between said bar and dollar-registering wheel, substantially as and for the purpose described.

26. In a cash register and indicator, the combination of a set of keys indicating cents, a set of tablet-rods and tablets corresponding in value to said keys and operated thereby, a wheel registering cents and provided with a ratchet, a bar located transversely across and inclined relatively to the plane of said keys, a pawl actuated by said bar and engaging with the ratchet of said registering-wheel, a set of keys indicating dollars, a set of tablet-rods and tablets corresponding in value to said dollar-keys and operated thereby, a wheel registering dollars and provided with a ratchet, a bar located transeversely across and inclined relatively to the plane of said dollar-keys, and a pawl actuated by said bar and engaging with the ratchet of the dollar-registering wheel, substantially as and for the purpose described.

254–264

27. In a cash register and indicator, the combination of a set of keys indicating cents, a set of tablet-rods and tablets corresponding in value to said keys and operated thereby, a wheel registering cents

and provided with a ratchet, a bar extending transversely across said keys and having a vertically-inclined operating side, a pawl actuated by said bar and engaging with the ratchet of said registering-wheel, a set of keys indicating dollars, a set of tablet-rods and tablets corresponding in value to said dollar-keys and operated thereby, a wheel registering dollars and provided with a ratchet, a bar extending transversely across said dollar-keys and having a vertically-inclined operating side, and a pawl actuated by said bar and engaging with the ratchet of the dollar-registering wheel, substantially as described, and for the purpose specified.

28. The combination, with the operating-keys indicating cents, of the bar L, inclined relatively to the plane of said keys, cent-registering wheel G, provided with a ratchet, J, and dog *d*, actuated by the bar L and engaging with said ratchet J, substantially as and for the purpose described

29. The combination, with the set of operating-keys indicating cents and the set of tablet-rods carrying tablets indicating cents, of the bar L, inclined relatively to the plane of said keys, cent-registering wheel G, provided with a ratchet, J, and dog *d*, actuated by the bar L and engaging with said ratchet J, substantially as described, and for the purpose specified.

30. The combination of the set of operating-keys indicating cents, bar L, inclined relatively to the plane of said keys and operated thereby, cent-registering wheel G, provided with a ratchet, J, dog *d*, actuated by the bar L and engaging with said ratchet J, the set of keys indicating dollars, the bar L, inclined relatively to the plane of said keys and operated thereby, the dollar-registering wheel provided with a ratchet, J, and the dog *d*, actuated by said bar L and engaging with the ratchet J of the dollar-registering wheel, substantially as and for the purpose described.

31. The combination of the set of operating-keys indicating cents and the set of tablet-rods provided with tablets indicating cents, bar L, inclined relatively to the plane of and operated by said keys, cent-registering wheel G, provided with a ratchet, J, dog *d*, actuated by the bar L and engaging with said ratchet J, the set of keys indicating dollars, and tablet-rods provided with tablets indicating dollars, the bar L, inclined relatively to the plane of and operated by the dollar-keys, the dollar-registering wheel G, provided with a ratchet, J, and the dog *d*, actuated by said bar L and engaging with the ratchet J of the dollar-registering wheel, substantially as and for the purpose described.

32. The combination, with the registering-wheels G H, each provided with a ratchet-wheel, J, of the rock-shaft W, extending transversely across said registering-wheels and provided at one end with an arm, *n*, adapted to engage with a pin, *m*, upon the registering-wheel G, and upon its opposite end with an arm, *o*, carrying a spring-dog, *p*, engaging with the ratchet-wheel J of the registering-wheel H, substantially as and for the purpose described.

33. In a cash register, the combination, with a series of operating-keys, the vibrating frame C, actuated by the operation of any one of said keys and provided with a rod, U, of the brake-shoe T and a

brake-wheel, S, secured to the hub of the registering-wheel, and with which said shoe is arranged to engage, substantially as and for the purpose described.

34. The combination and arrangement of the wing E, gong-hammer B′, gong F, extension C′, with its nose *r*, dog *s*, arm *t*, draw-bar D′, and vibrating frame C, substantially as and for the purpose described.

35. In a cash register and indicator, the combination of a series of keys, a vibrating frame operated by said keys, a till-compartment having a hinged lid, and locking and tilting mechanism interposed between said lid and vibrating frame, whereby the operation of any one of the keys unlocks the lid and throws it open, substantially as described.

36. The combination and arrangement of the hinged lid G′, till-compartment F′, spring-bolt *a′*, draw-bar *b′*, bell-crank *c′*, vibrating arms *e′*, and vibrating frame C, substantially as and for the purpose described.

37. In a cash register, the combination, with a series of keys, a registering-wheel and connections between them, a brake-rim connected with the registering-wheel, and a co-operating brake, of a bar arranged to be operated by all the keys of the series connected with said brake-shoe, whereby upon the operation of any key the brake will be applied, substantially as described.

JOHN H. PATTERSON.

Witnesses:
WILLIAM B. SULLIVAN.
FRANK D. FOWLER.

265 UNITED STATES PATENT OFFICE.

JOHN F. HEADY and JOHN H. PATTERSON, of Dayton, Ohio, assignors to the National Cash Register Company, of same place.

Cash Register and Indicator.

Specification forming part of Letters Patent No. 384,158, dated June 5, 1888. Application filed November 16, 1887. Serial No. 255,311. (No model.)

To all whom it may concern:

Be it known that we, John F. Heady and John H. Patterson, citizens of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful improvements in cash registers and indicators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

Our invention relates to improvements in the construction of this class of machines whereby they are simplified and rendered more efficient and complete in action. Its novelty will be herein set forth, and specifically pointed out in the claims.

(Here follow diagrams marked pp. 256, 258–260, 262, & 264.)

In the accompanying drawings, figure 1, sheet 1, represents an end elevation of a machine embodying our invention. Fig. 2, sheet 1, is a sectional detail to be referred to hereinafter. Fig. 3, sheet 2, is a front elevation of a machine embodying our invention, looking at the same in the direction of the arrow shown in Fig. 1, and with the tablets removed. Fig. 4, sheet 3, is a front elevation of the machine with the front ends of the keys cut off and the spring mechanism for the registering-wheels removed. Fig 5, sheet 4, is a rear elevation in section showing the lower bank of registering-wheels, their operating keys and dogs. Fig. 6, sheet 5, is a sectional end elevation through the dotted line *x x* of Fig. 3, looking toward the right-hand end of the machine. Fig. 6*a*, sheet 5, is a detail sectional view, showing the position of a dog on the key, actuating a registering-wheel when the key is depressed. Fig. 7, sheet 5, is a sectional detail to be referred to hereinafter. Fig. 8, sheet 5, is a detail perspective showing the arrangement and application of a series of brake-dogs to the registering-wheels. Fig. 9, sheet 1, is a detail view of the bell-sounding apparatus. Fig. 10, sheet 4, is a detail perspective view, taken from the rear, showing the dog actuating the sales-registering wheel.

The same letters of reference are used to indicate identical parts in all the figures.

The general construction of this class of machines is so well known that it is sufficient to state here that A is the frame-work; B, the fulcrum-shaft for the keys C strung and vibrating thereon;

(No Model.) 5 Sheets—Sheet 1.

J. F. HEADY & J. H. PATTERSON.

CASH REGISTER AND INDICATOR.

No. 384,158. Patented June 5, 1888.

No 155 N.C.R.Co. } 256
R.C.A.H.R.Co.

Fig. 2.

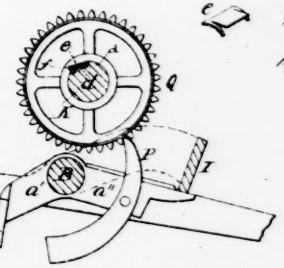


Fig. 9.

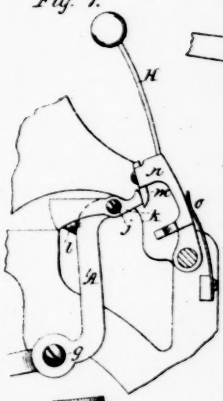
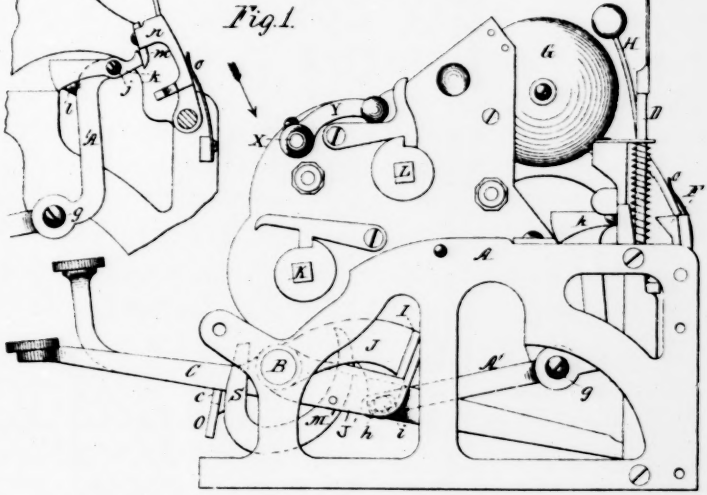


Fig. 1.



Witnesses:
W. C. Jirdinston.
Charles Billon.

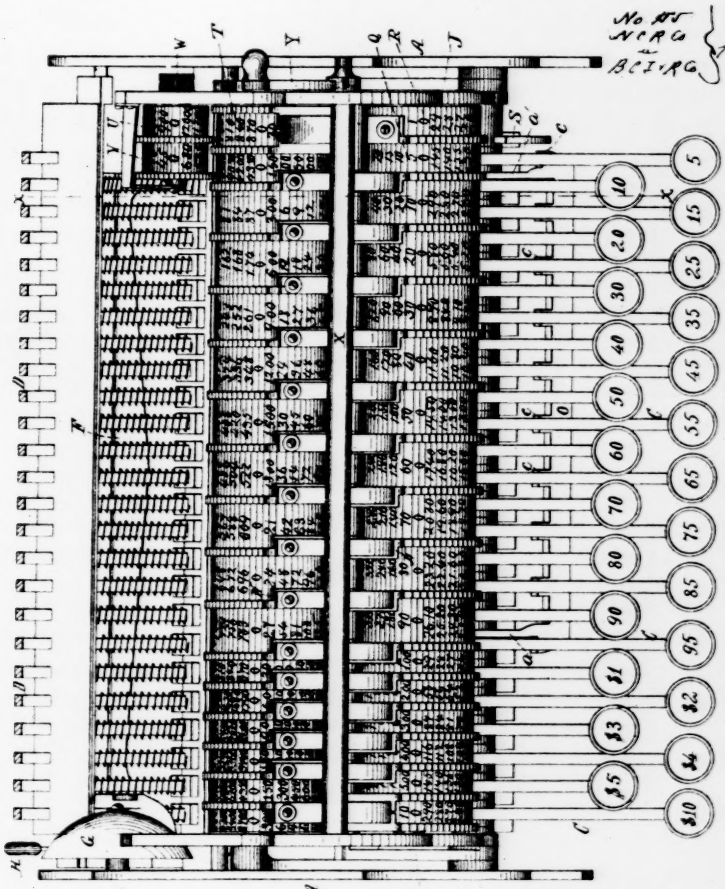
Inventors:
John F. Heady and
John H. Patterson.
by Peck & Peck
Attorneys.

(No Model.) 5 Sheets—Sheet 2.

J. F. HEADY & J. H. PATTERSON.

CASH REGISTER AND INDICATOR.

No. 384,158. Patented June 5, 1888.



Witnesses:
W. C. Jordinston.
Charles Billow.

Fig. 3.

Inventors:
John F. Heady, and
John H. Patterson.
by Peck & Reed
Attorneys.

(No Model.) 5 Sheets—Sheet 3.

J. F. HEADY & J. H. PATTERSON.

CASH REGISTER AND INDICATOR.

No. 384,158. Patented June 5, 1888.

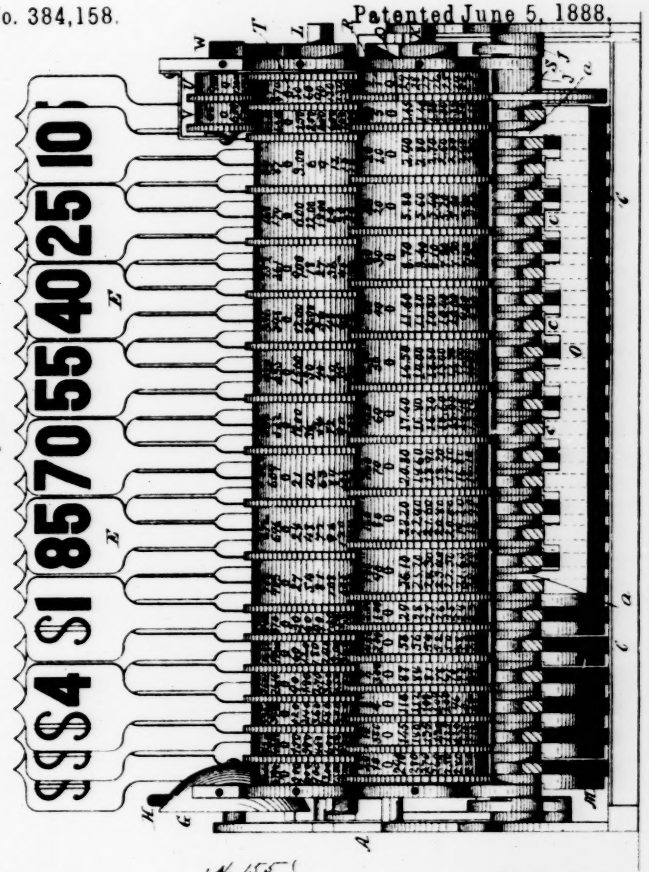


Fig. 4.

Witnesses:
W. C. Jirdinston.
Charles Billow.

No. 155 } 260
NC A G }
PC STA G }

Inventors:
John F. Heady, and
John H. Patterson.
by Peck & Reitor.
his Attorneys.

(No Model.) 5 Sheets—Sheet 4.

J. F. HEADY & J. H. PATTERSON.

CASH REGISTER AND INDICATOR.

No. 384,158. Patented June 5, 1888.

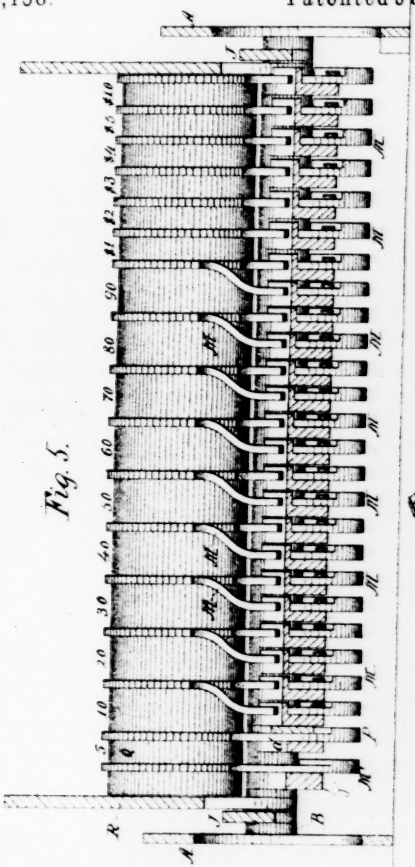


Fig. 5.



Fig. 10.

No 155 NCRC } p 262
v.
BCS & RC

Witnesses:
W. C. Tirdinston
Charles Billon

Inventors:
John F. Heady, and
John H. Patterson.
by Peck & Rector
Attorneys.

(No Model.) 5 Sheets—Sheet 5.

J. F. HEADY & J. H. PATTERSON.

CASH REGISTER AND INDICATOR.

No. 384,158. Patented June 5, 1888.

Fig. 8.

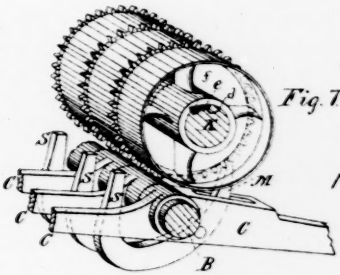


Fig. 7.

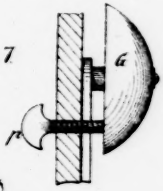
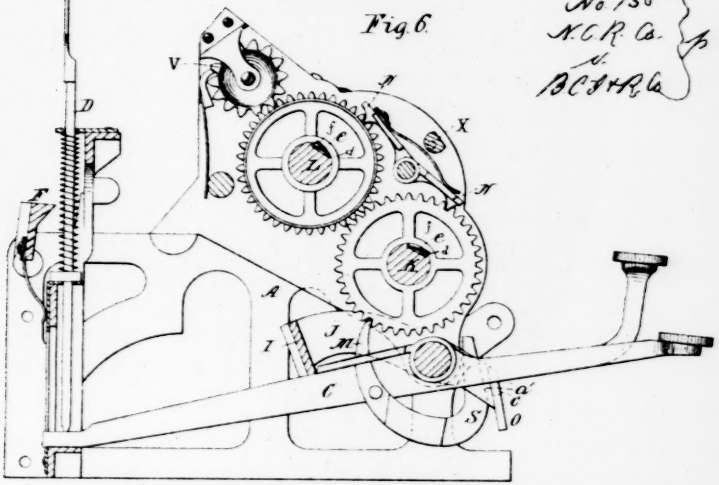
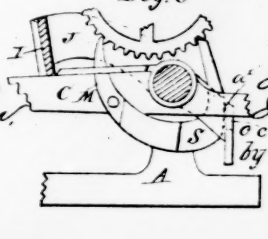


Fig. 6.



No. 155 N.C.R.Co. } p. 264
v.
B.C.&H.R.Co.

Fig. 6a



Witnesses:
W. C. Jirdinston.
Charles Billon.

Inventors:
John F. Heady, and
John H. Patterson.
by Peck & Peirce.
Attorneys.

D, the tablet-rods carrying the tablets E, resting each on its corresponding key, and held in an elevated position with its tablet exposed to view, whenever its key is operated, by means of the wing F and the shoulder on the tablet-rod.

G is the usual gong; H its hammer actuated through suitable connecting mechanism to strike the gong whenever any key is operated; I, the vibrating frame extending across the top of the keys in rear of the shaft B and hung thereon by side arms, J J'.

K L are the shafts journaled transversely across the frame, upon the former of which the lower bank of registering-wheels is strung, and upon the latter of which the upper bank is strung. The registering-wheels are of the usual construction and provided with teeth to engage with the actuating-dogs M, pivoted to the keys, and are provided with spring-pressed dogs N of the usual construction.

The first feature of our invention relates to the five-cent or odd-number carrying-bar, and is an improvement upon the construction shown and described in patent No. 325,260, of September 1, 1885, to W. H. Maxwell. This five-cent bar O, as seen in Figs. 3 and 4, is hung by side arms *a a'* upon the shaft B, and extends in front of the shaft B transversely under all of the keys which indicate less amounts than one dollar. The upper edge of this bar is provided with upward projections *c*, one under each key, bearing an odd multiple of five, in such manner that whenever any of said odd-numbered keys are depressed said bar is depressed with the key; but whenever any of the keys bearing even multiples of five are depressed they will pass between the projections on the bar and it will not be actuated.

The arm *a'*, as seen more particularly in Fig. 2, has a rearward extension *a''*, to which is pivoted a dog, P, which engages with the teeth on the five-cent registering-wheel Q, so that whenever the five-cent bar is depressed by the operation of any of the keys bearing odd multiples of five the dog P is actuated to turn the five-cent wheel one notch. There is in this instance no dog pivoted to the five-cent key, as the dog P upon the five-cent bar takes its place, and whenever the five-cent key alone is operated the five-
266 cent bar is depressed and its dog P actuates the five-cent wheel. If desired, however, the five-cent key may have an independent dog engaging with the teeth on the five-cent wheel to actuate said wheel whenever said key is operated, in which event the five-cent bar need not extend under or engage with the five-cent key.

The inner end of the extension *a''* of the arm *a'* passes back under the vibrating frame I, so as to engage therewith, which frame, by its weight, serves to reset the five-cent bar after each of its operations, as well as to hold it up in its normal position of rest.

It will be observed that there are no registering-wheels bearing odd multiples of five, excepting the one five-cent wheel. Each of the operating-keys is provided with an actuating-dog, M. The dog M on each of the odd-numbered keys engages directly with the teeth of the registering-wheel bearing the next lower even multiple of five, while the dog on the key bearing said next lower even multiple

of five is extended and bent to engage with the teeth of the same wheel. Thus the dogs on the ten and fifteen cent keys both engage with and actuate the ten-cent wheel. It will thus be seen that whenever the fifteen-cent key is operated the ten-cent registering-wheel is turned one notch to register ten cents, and through the medium of the five-cent bar, which is depressed by the operation of said key, the five-cent wheel is turned one notch to register five cents. In the same manner when the twenty-five cent key is operated twenty cents is registered on the twenty-cent wheel and five cents on the five-cent wheel, and so on. It will be observed that there is an indicating-tablet for each key, so that whenever any key is operated, whether it bears an even or an odd number, its tablet bearing a corresponding number is exposed to view through the reading-opening.

Under the construction shown and described in the patent before referred to, whenever an odd-numbered key was operated to indicate and register an odd amount—for instance, twenty-five cents—three keys were depressed and two tablets exposed—namely, the twenty-five, twenty, and five cent keys, and the twenty and the five cent tablets—whereas under our improved construction only one key is depressed and only one tablet exposed, and those are the ones bearing the exact amount desired to be indicated and registered.

The next feature of our invention relates to mechanism for registering the number of operations of the machine; and it consists in an additional registering-wheel, R, strung upon the shaft K and actuated at each operation of the machine by means of the dog M′, pivoted to the arm J′ of the vibrating frame I, as seen in Fig. 1. Thus it will be seen that whenever any key is depressed the operation of the machine is registered upon the wheel R, which wheel we term the "sales-registering" wheel. The upper bank is similarly provided with an additional registering-wheel, T, which is turned one notch for every complete revolution of the wheel R by means of an engaging-tooth common to this class of registering-wheels.

As the wheel R and the five-cent-registering wheel will be the wheels most frequently actuated in the ordinary operation of the machine, we provide two additional wheels, U V, upon a shaft, W, suitably journaled to the frame-work, as seen in Figs. 3 and 4, the former to be actuated by the wheel T and the latter by the five-cent wheel of the upper bank.

The next feature of our invention consists in the application of a spring-compressing rock-shaft, X, in this instance eccentrically journaled in the frame transversely across all of the springs of the dogs N in such manner that by turning it in one position by means of the handle Y it will compress all of the springs uniformly and hold the dogs in more positive engagement with the teeth of the registering-wheels, while by turning it in the opposite direction the springs will be relieved and the dogs held in engagement by the normal pressure of the springs only. This shaft X is particularly useful when it is desired to turn all of the registering-wheels back to zero, for in such case, under the ordinary pressure of the springs,

the dogs sometimes permit the wheels to be revolved past the zero-notch, which will not be the case when held in more positive engagement by the increased pressure given by the rock-shaft.

Instead of journaling the rock-shaft eccentrically, it might be eccentrically shaped in cross-section, or it might be of any suitable shape and provided with projections to engage with the springs.

The next feature of our invention relates to brake mechanism for the registering-wheels; and it consists in the employment of a novel brake-dog forfeach of the registering-wheels of the lower bank—in this instance in addition to the ordinary holding-dogs. One of these brake-dogs (lettered S) is shown in Fig. 1, and a series of them in Fig. 8. They are not shown in Figs. 3 and 4, excepting the one for the sales-registering wheel. They are formed by extending the actuating-dogs M forwardly and upwardly in such manner that whenever a key is operated the nose of its brake-dog will engage with the teeth upon the front side of the corresponding registering-wheel at the exact moment of the completion of the stroke of the key, so that even if the key is violently operated its registering-wheel cannot possibly turn but one notch, thus insuring complete accuracy in the registering operation of the machine.

The next feature of our invention relates to the resetting mechanism for the registering-wheels, and is illustrated in Fig. 2. It consists in forming a groove, *d*, in the periphery of the shafts K L their entire length, and inserting therein for each registering-wheel a split spring, *e*, which, in rotating the shaft to reset the wheels to zero, engages with a notch, *f*, cut in the bore of the hub of
267 the registering-wheel. One of these springs *e* is shown in perspective at the side of the wheel in Fig. 2.

While we preferably employ an individual spring for each wheel, each spring may be made long enough to extend through several wheels, if desired, and the number of springs thus diminished. It will be readily seen from this construction that the wheels of each bank can turn freely in one direction upon their shaft, but upon rotating the shaft in the same direction all of the wheels will be caught up by the engagement of the springs *e* with the notches *f*, and be rotated thereby to reset them to zero. In this manner the employment of dogs is obviated and the construction much simplified.

The remaining feature of our invention is illustrated in Figs. 1 and 9, and relates to the tripping mechanism for actuating the wing and gong-hammer simultaneously whenever any key is operated. It consists in a bell-crank lever, *N'*, pivoted, as at *g*, to the side of the frame, and having its forward end slotted, as at *h*, and connected by a screw or stud, *i*, to the vibrating frame I. The upper end of this bell-crank lever has pivoted to it, as at *j*, a dog, *k*, held normally in working position by a stop, *l*, upon the lever. The nose of this dog engages with an adjustable wiper-block, *m*, secured to the extension *n* of the wing, to which extension is also attached the gong-hammer H. The parts are so adjusted that by the depression of any key and the raising of the vibrating frame I the dog *k* presses back the wing and gong-hammer against the resistance of a

spring, o, until, the key having reached its limit of depression, the dog becomes automatically released from the wiper-block, and the spring o causes the hammer to strike the gong and the wing to be reset. The release of the key resets the parts to their normal position.

In Fig. 7 is shown a damper for deadening the sound of the gong whenever desired. It consists, in this instance, of a wooden screw, p, inserted through a threaded opening in the side of the case of the machine in such position that when screwed in its inner end bears against the edge of the gong with more or less force to deaden its sound.

Having thus fully described our invention, we claim—

1. In a cash register and indicator, the combination, with the five-cent-registering wheel and a series of keys indicating odd multiples of five above the first power, of a five-cent bar independent of the five-cent key and actuated by said series of keys, and a dog pivoted to said five-cent bar and engaging with the teeth of the five-cent wheel, substantially as and for the purpose described.

2. In a cash register and indicator, the combination, with a five-cent-registering wheel, a series of wheels registering even multiples of five, and a series of keys indicating odd multiples of five above the first power, of a five-cent bar independent of the five-cent key and actuated by said series of keys, a dog pivoted to said five-cent bar and engaging with the teeth of the five-cent wheel, and a dog pivoted to each of said odd-numbered keys and engaging with the teeth on the wheel registering the next lower even multiple of five, substantially as and for the purpose described.

3. In a cash register and indicator, the combination, with a five-cent-registering wheel, a series of wheels registering even multiples of five, and a series of keys indicating even and odd multiples of five above the first power, of a five-cent bar actuated by the odd-numbered keys, a dog pivoted to said five-cent bar and engaging with the teeth of the five-cent wheel, a dog pivoted to each odd-numbered key and engaging with the teeth of the wheel registering the next lower even multiple of five, and a dog pivoted to each even-numbered key and engaging with the teeth of the wheel registering the multiple of five indicated by such key, substantially as described.

4. In a cash register and indicator, the combination, with a five-cent-registering wheel, a series of wheels registering even multiples of five, and a series of keys indicating five and the even and odd multiples thereof, of a five-cent bar independent of but arranged to be actuated by each of the odd-numbered keys, a dog pivoted to said five-cent bar and engaging with the teeth of the five-cent wheel, a dog pivoted to each odd-numbered key excepting the five-cent key and engaging with the teeth of the wheel registering the next lower even multiple of five, and a dog pivoted to each even-numbered key and engaging with the teeth of the wheel registering the

multiple of five indicated by said key, substantially as and for the purpose described.

5. In a cash register and indicator, the combination, with the five-cent-registering wheel, a series of keys indicating odd multiples of five above the first power, and a series of tablet-rods and indicating-tablets, one for each of said odd-numbered keys, of a five-cent bar independent of the five-cent key and actuated by said series of keys, and a dog pivoted to said five-cent bar and engaging with the teeth of the five-cent wheel, substantially as and for the purpose described.

6. In a cash register and indicator, the combination, with a five-cent-registering wheel, a series of wheels registering even multiples of five, a series of keys indicating both even and odd multiples of five above the first power, and a series of tablet-rods and indicating-tablets, one for each of said keys, of a five-cent bar actuated by the odd-numbered keys, a dog pivoted to said five-cent bar and engaging with the teeth of the five-cent wheel, a dog pivoted to each odd-numbered key and engaging with the teeth of the wheel registering the next lower even multiple of five, and a dog pivoted to each even-numbered key and engaging with the teeth of the wheel registering the multiple of five indicated by said key, substantially as and for the purpose described.

268–284 7. In a cash register and indicator, the combination, with a five-cent-registering wheel, a series of keys indicating five and the odd multiples thereof, and a series of tablet-rods and indicating-tablets, one for each key, of a five-cent bar independent of but arranged to be actuated by each of said keys, and a dog pivoted to said five-cent bar and engaging with the teeth of the five-cent wheel, substantially as and for the purpose described.

8. In a cash register and indicator, the combination, with a five-cent-registering wheel, a series of wheels registering even multiples of five, a series of keys indicating five and the even and odd multiples thereof, and a series of tablet-rods and indicating-tablets, one for each key, of a five-cent bar independent of but arranged to be actuated by each of the odd-numbered keys, a dog pivoted to said five-cent bar and engaging with the teeth of the five-cent wheel, a dog pivoted to each odd-numbered key excepting the five-cent key and engaging with the teeth of the wheel registering the next lower even multiple of five, and a dog pivoted to each of the even-numbered keys and engaging with the wheel registering the multiple of five indicated by said key, substantially as and for the purpose described.

9. In a cash register and indicator, the combination of a series of operating-keys representing the even multiples of five, another series of keys representing the odd multiples of five, registering mechanism operated by said keys, a bar actuated by the operation of any one of the keys of either series, a sales-registering wheel, and connecting mechanism between said vibrating bar and sales-regis-

tering wheel, whereby, upon the operation of any key of either series, said sales-registering wheel will be actuated to register the total number of times the machine has been operated, substantially as described.

10. In a cash register and indicator, the combination of a series of operating keys representing the even multiples of five, another series of keys representing the odd multiples of five, registering mechanism operated by said keys, a vibrating bar actuated by the operation of any one of the keys of either series, a sales-registering wheel, and a dog pivoted to said vibrating bar and engaging with the teeth of said sales-registering wheel, substantially as described, and for the purpose specified.

11. In a cash register and indicator, the combination, with a series of registering-wheels, of a series of holding-dogs engaging therewith, a series of springs bearing with pressure on said dogs and tending to hold them in engagement with the wheels, and a rock-shaft extending transversely across the machine and operating, when turned in one position, to bear upon the springs and increase their pressure upon the dogs, and when turned in an other position to leave said springs bearing with normal pressure only on said dogs, substantially as and for the purpose described.

12. In a cash register and indicator, the combination, with a series of registering-wheels, of a series of holding-dogs engaging therewith, a series of springs bearing with pressure on said dogs and tending to hold them in engagement with the wheels, and a rock-shaft eccentrically journaled in and extending transversely across the machine and operating, when turned in one position, to bear upon the springs and increase their pressure upon the dogs, and when turned in another position to leave said springs bearing with normal pressure only on said dogs, substantially as and for the purpose described.

13. In a cash register and indicator, the combination, with a series of registering-wheels, of a series of keys pivoted on an axis parallel to the axis of the registering-wheels, and a series of substantially U-shaped dogs pivoted to the keys in rear of the axis of the latter and embracing said axis, one end of said dogs co-operating with the registering-wheels to propel them and the other end co-operating with said wheels to arrest them after being so propelled, substantially as described.

14. The combination, with the shaft K, provided with a longitudinal groove, *d*, and the registering-wheels strung upon said shaft and the bores of their hubs provided with notches *f*, of the interposed split springs *e*, confined in the groove *d* of the shaft, substantially as and for the purpose described.

15. In a cash register and indicator, the combination, with the tablet-rods and tablets, tablet-supporting wing, gong, gong-hammer and its extension, a series of keys, and a vibrating frame which is

actuated whenever any key is operated, of the bell-crank lever A′, pivoted to the frame of the machine and to the vibrating frame, and carrying at its upper end a pivoted tripping-dog, *k*, which engages with a wiper-block upon the wing-extension, substantially in the manner and for the purpose described.

16. In a cash register and indicator, the combination, with the gong G, supported on the interior of the casing, of the thumb-screw *p*, screwed through the casing from the outside and impinging on the gong to form an adjustable damper therefor, substantially as described.

JOHN F. HEADY.
JOHN H. PATTERSON.

Witnesses to John F. Heady's signature:

N. LINDENFELD.
S. B. LOCKWOOD.

Witnesses to John H. Patterson's signature:

HENRY THEOBALD.
THOS. CORWIN.

THE LAW ASSOCIATION
—OF—
PHILADELPHIA.

285 UNITED STATES PATENT OFFICE.

JOHN F. HEADY and JOHN H. PATTERSON, of Dayton, Ohio, assignors to the National Cash Register Company, of same place.

Cash Indicator and Register.

Specification forming part of Letters Patent No. 386,401, dated July 17, 1888. Application filed November 16, 1887. Serial No. 255,312. (No model.)

To all whom it may concern:

Be it known that we, JOHN F. HEADY and JOHN H. PATTERSON, citizens of the United States, residing at Dayton, in the county of Montgomery, and State of Ohio, have invented certain new and useful improvements in cash registers and indicators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

Our invention relates to improvements in cash registers and indicators designed for the use of store-keepers and others as a means of accurately registering the total receipts for any given period of time and for indicating to the customers that the amounts paid have been registered by disclosing to their view such amounts on figured tablets.

It has for its object an improvement in the construction of this class of machines, and its novelty will be herein set forth, and specifically pointed out in the claims.

(Here follow diagrams marked pp. 268, 270, 272, 274, 276, 278, 280, 282, & 284.)

In the accompanying drawings, figure 1, sheet 1, is a plan view of a cash register and indicator embodying our present invention removed from its case. Fig. 2, sheet 2, is a front elevation of the same with the front portion of the keys cut off on the dotted line *x x* of Fig. 1 and with the lower portion of the plate containing the reading-openings cut away. Fig. 3, sheet 3, is a side elevation of the same with portions of the gong and frame-work broken away. Fig. 4, sheet 4, is a sectional side elevation of the same through the dotted line *y y* of Fig. 1. Fig. 5, sheet 4, is a sectional detail view representing the automatic locking mechanism for preventing the operation of the machine except when the drawer is locked. Fig. 6, sheet 4, is a sectional detail view representing means for throwing the automatic locking mechanism out of action when desired. Fig. 7, sheet 5, is a sectional side elevation through the dotted line *z z* of Fig. 1. Fig. 8, sheet 6, is a plan view of the supplementary vibrating frames, together with the front portion of the main vibrating frame. Fig. 9, sheet 7, is a rear elevation of the lower corner of the machine, showing the means for preventing the operation of more than one of the keys of a group at the same time. Fig.

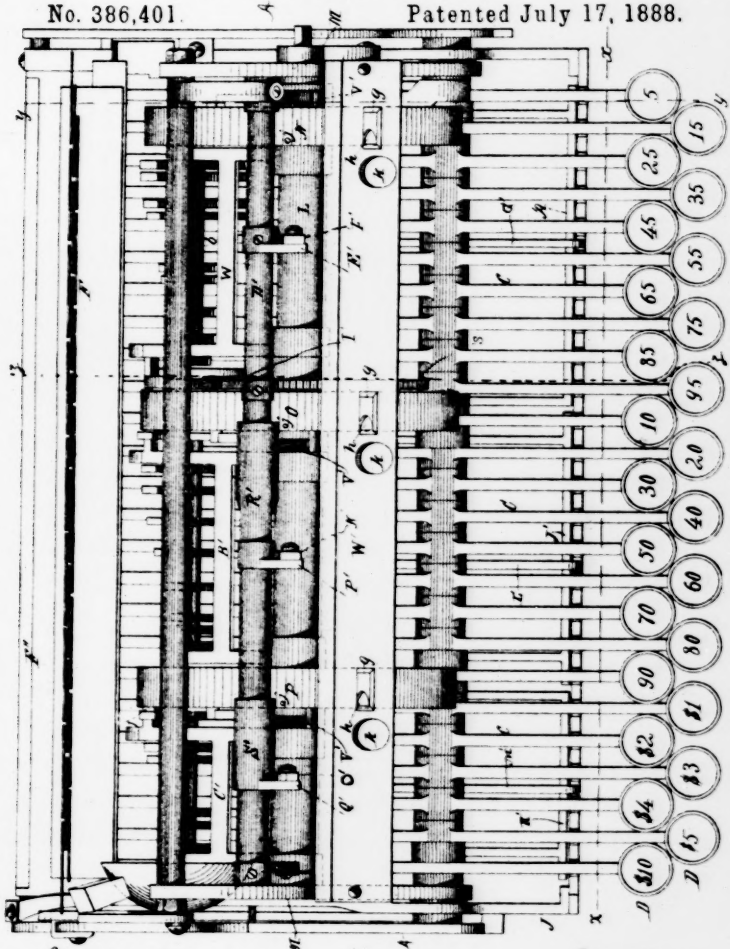
No. 155 N.C.R. Co. p. 270
B.C.R.R. Co.

(No Model.) 8 Sheets—Sheet 1.

J. F. HEADY & J. H. PATTERSON.

CASH INDICATOR AND REGISTER.

No. 386,401. Patented July 17, 1888.



Witnesses:
W. C. Jordinston.
Charles Billon.

Fig. 1.

Inventors:
John F. Heady & John H. Patterson
by Peck & Peck
Attorneys.

No. 155
N.C.R. Co.
B.C.D.R.C. } p. 272

(No Model.) 8 Sheets—Sheet 2.

J. F. HEADY & J. H. PATTERSON.

CASH INDICATOR AND REGISTER.

No. 386,401. Patented July 17, 1888.

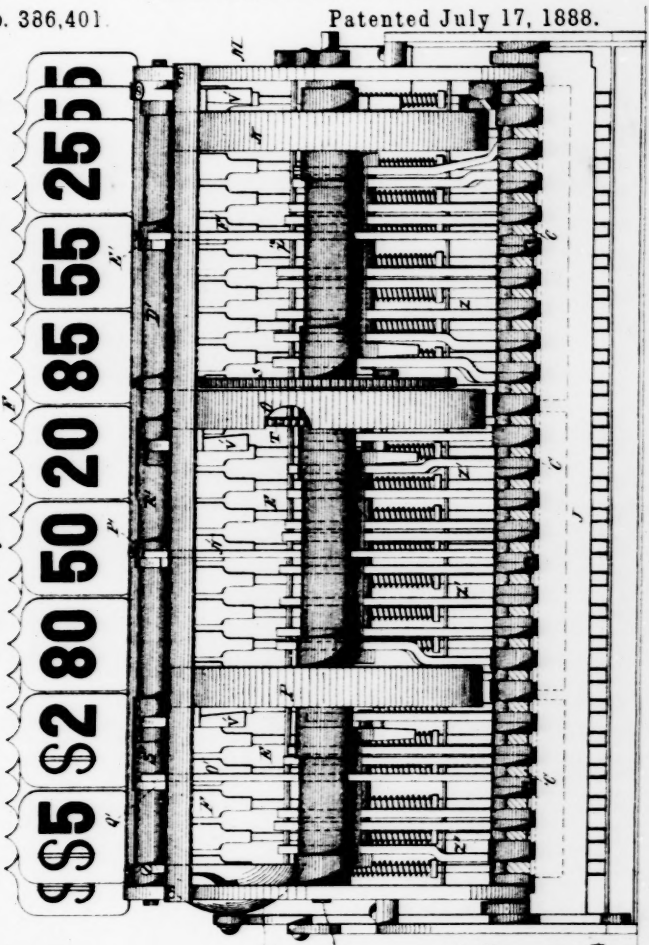


Fig. 2.

Witnesses:
W. C. Tirdinston.
Charles Billon.

Inventors:
John F. Heady, and
John H. Patterson.
by Peck & Peck
Attorneys.

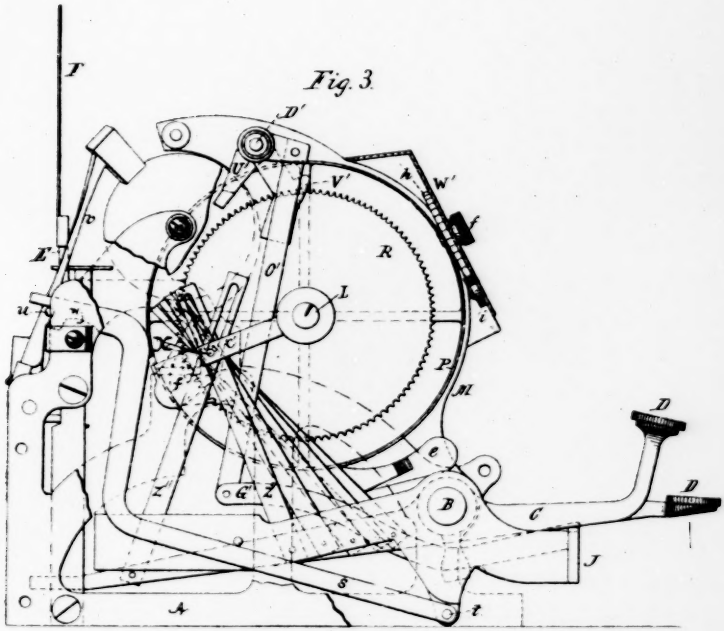
(No Model.) 8 Sheets—Sheet 3.

J. F. HEADY & J. H. PATTERSON.

CASH INDICATOR AND REGISTER.

No. 386,401. Patented July 17, 1888.

Fig. 3.



No. 155
N. C. R. Co. } p. 274
B. C. & R. C.

Witnesses:
W. C. Jordinston.
Charles Billon

Inventors:
John F. Heady, and
John H. Patterson,
by Peck & Pector
their Attorneys.

(No Model.) 8 Sheets—Sheet 4.

J. F. HEADY & J. H. PATTERSON.

CASH INDICATOR AND REGISTER.

No. 386,401. Patented July 17, 1888.

No 155
N. C. R. C. } p. 276
v.
B. C. & R. C.

Fig. 4.

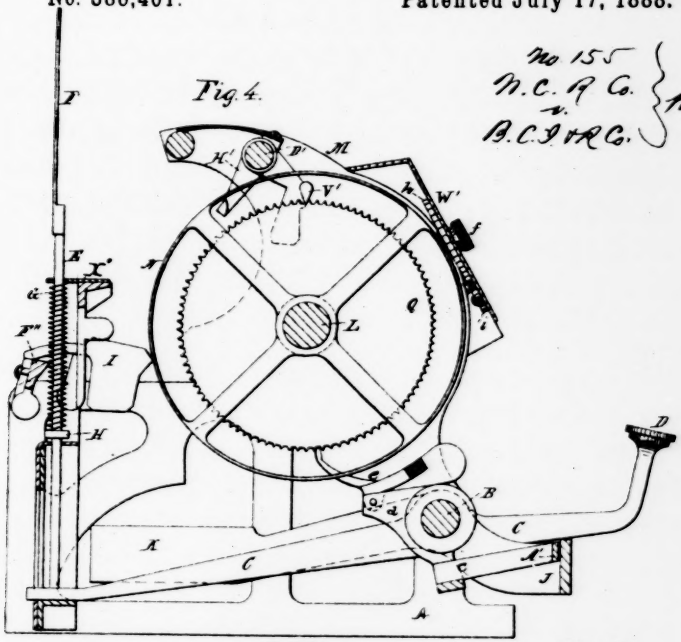


Fig. 5.

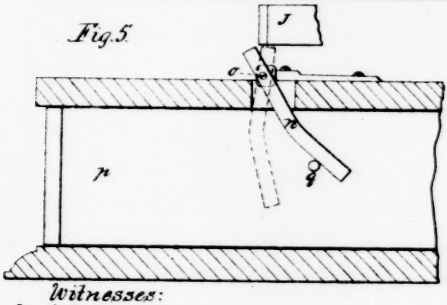
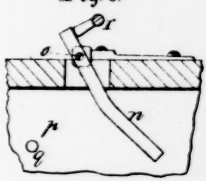


Fig. 6.



Witnesses:
W. C. Jirdinston.
Charles Billon.

Inventors:
John F. Heady, and
John H. Patterson,
by Cook & Rector
Attorneys.

(No Model.) 8 Sheets—Sheet 5.

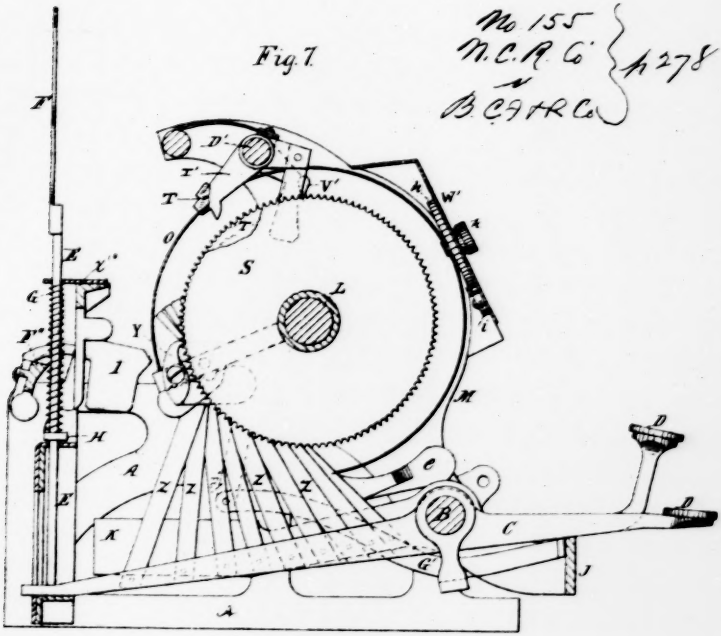
J. F. HEADY & J. H. PATTERSON.

CASH INDICATOR AND REGISTER.

No. 386,401. Patented July 17, 1888.

Fig. 7.

No 155
N.C.R.Co. } A 278
B.C.G.&R.Co.



Witnesses:
W. C. Jordinston.
Charles Billon.

Inventors:
John F. Heady, dec'd
John H. Patterson.
by Peck & Rector.
Attorneys.

(No Model.) 3 Sheets—Sheet 6.

J. F. HEADY & J. H. PATTERSON.

CASH INDICATOR AND REGISTER.

No. 386,401. Patented July 17, 1888.

No. 155 N.C.R. Co. } p. 280 vs. A.C.S.H.R.C.

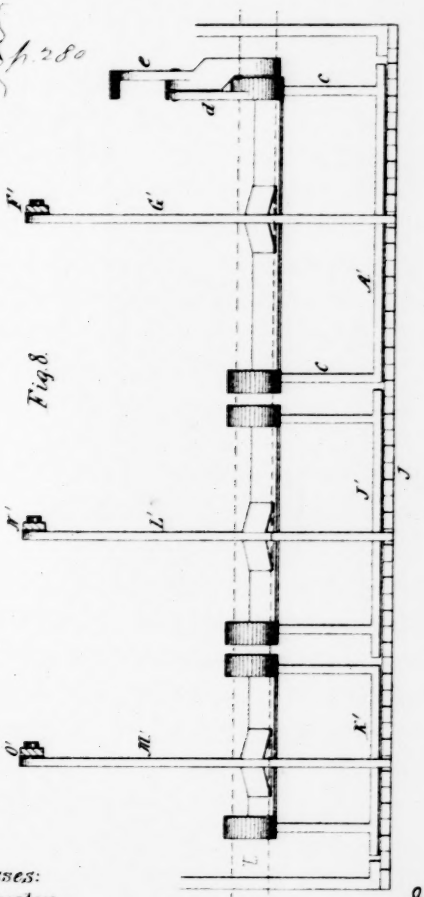


Fig 8.

Witnesses:
W. C. Irrdinston.
Charles Billon

Inventors:
John F. Heady
and John H. Patterson.
by Peck & Rector
Attorneys.

(No Model.) 8 Sheets—Sheet 7.

J. F. HEADY & J. H. PATTERSON.

CASH INDICATOR AND REGISTER.

No. 386,401. Patented July 17, 1888.

No 155 N. C. R. Co. 1 p 1 2 82
2 B C Br. R Co.



Fig. 11

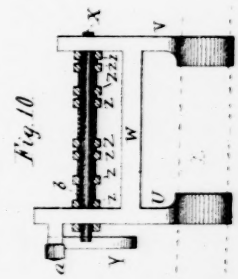


Fig. 10

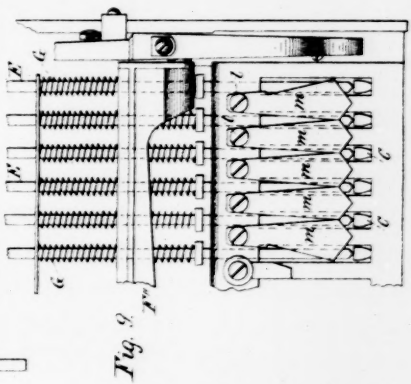


Fig. 9

Witnesses:
W. C. Jordinston
Charles Dillon

Inventors:
John F. Heady and
John H. Patterson
by Peck & Peck
Attorneys.

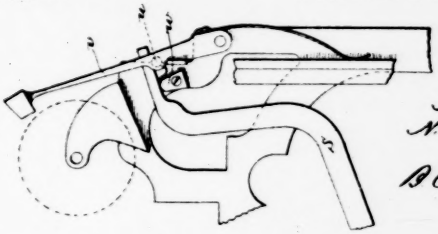
(No Model.) 8 Sheets—Sheet 8.

J. F. HEADY & J. H. PATTERSON.

CASH INDICATOR AND REGISTER.

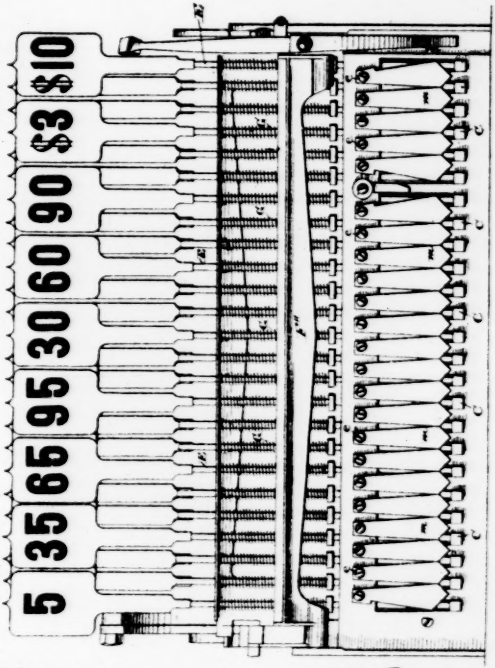
No. 386,401. Patented July 17, 1888.

Fig. 13



No 155
N.C.R. Co
vs
B.C.I.R.Co. } N. 2824.

Fig. 12



Witnesses
Chas D. Burr.
Melville Church.

Inventors.
John F. Heady and
John H. Patterson.
by Peck & Renton
their Attorneys.

10, sheet 7, is a detail view of the vibrating dog-carrier and its dog. Fig. 11, sheet 7, is a rear elevation of the supplemental registering mechanism. Fig. 12, sheet 8, is a rear view of the machine, showing the application of the stops to the different sets of series of keys. Fig. 13, sheet 8, is a detail view of the mechanism for tripping the gong-hammer.

The same letters of reference are used to indicate identical parts in all the figures.

This machine, like others of its class having tablets which are to be exposed to view upon the operation of any key, is contained in a locked case or cabinet, the upper part of which is provided with glass windows, through which the tablets can be seen when exposed, and in the lower part of which is contained a money drawer or till, with mechanism whereby whenever any key is operated said drawer is thrown open, and which cabinet (not here shown) may be of the usual or any suitable construction.

The frame-work A of the machine, properly braced by suitable cross-bars, has secured in its lower front portion a shaft, B, on which the operating keys C, extending to the back of the machine and projecting through slots in the front of the cabinet, are strung and pivoted. As is customary for utilizing space, these keys at their front ends are arranged in two banks and are provided with numbered buttons D.

Supported vertically in guides X^{10} at the back of the machine are a series of tablet-rods, E, with their lower ends resting one upon each key, and each of which rods is provided at its upper end with a tablet, F, bearing on each side a number corresponding in value with that of the key upon which it rests.

F″ is the usual tablet-supporting wing, G the resetting-springs, and H the detents or shoulders upon the tablet-rods, which are caught by the wing to hold the tablet exposed.

I is the usual retracting-weight for resetting the wing.

J is the main vibrating frame, extending under all of the keys, hung upon the shaft B, and provided with weighted resetting-arms K.

All of the parts thus far described are well known in this class of machines and need no further description.

286 One feature of our invention relates to the registering mechanism and the means for operating it, and may be described as follows:

Upon a shaft, L, journaled in the secondary frame M of the machine, which is supported upon and carried by the main frame, are three registering-wheels, N O P, which are journaled loosely upon said shaft. Each of these wheels has upon its periphery one hundred numbers, those on the wheel N being the multiples of five from 0 to 495, those on the wheel O the multiples of ten from 0 to 990, and those on the wheel P the multiples of one from 0 to 99, each inclusive. The hub of the wheel N has secured to it a disk, Q, Fig. 4, whose periphery is provided with one hundred teeth. The wheel P likewise has secured to its hub a disk, R, Fig. 3, provided with one hundred teeth, while the wheel O has secured to its

hub two similar disks, S T, one on each side, and each provided with one hundred teeth.

Between the wheels N and O there is hung upon the shaft L what we designate a vibrating "dog-carrier." (Illustrated more particularly in Fig. 10.) It is composed of two side arms, U V, whose hubs encircle and are journaled upon the shaft L and a transverse shaft, X, and in this instance is braced by a cross-bar, W. Upon a stud or spindle, *a*, extending from the rear end of the arm U, is pivoted a gravitating dog, Y, which engages with the teeth of the wheel S. In this instance there are nine keys grouped between the registering-wheels N and O, and they represent the odd multiples of five from 15 to 95, inclusive, and for each key there is an arm, Z, whose lower end is pivoted directly to the key and whose upper end is slotted, the shaft X of the dog-carrier extending through said slot. The upper end of these slotted arms Z may be spaced on the shaft X, to correspond with their lower ends, by means of spools *b*. It will be observed that in this instance the arms at the outer sides of the group are bent to avoid contact with the registering-wheels. These arms Z are pivoted to the operating keys C at unequal distances from the fulcrum-shaft B of said keys to cause each arm when its key is operated to vibrate the dog-carrier to the proper extent to turn the registering-wheel O the exact number of notches necessary to register the tens of the value of such key on said wheel in the following manner: The arm Z on the fifteen-cent key is pivoted thereto at a point nearer to the fulcrum-shaft B than are any of the other arms of the odd-numbered keys, and this point is at such distance from the fulcrum of said key that when the key is operated its arm Z will vibrate the dog-carrier just sufficiently to turn the wheel O one notch, and thereby register ten cents on said wheel. The arm Z of the next key—the twenty-five-cent key—is pivoted to the key at a point a little farther from the fulcrum-shaft, so that when this key is operated its arm will vibrate the dog-carrier far enough to turn the registering-wheel O two notches, and thereby register twenty cents on said wheel, and so on with all the odd-numbered keys up to and including 95, the amount registered on the wheel O being in each instance five cents less than the value of the key operated. The fives of these odd-numbered keys are registered on the wheel N in the manner and by the means to be now described.

Hung upon the shaft B by arms *c*, Fig. 4, is a five cent or odd-number carrying bar, A′, extending transversely under the forward ends of all of the odd-numbered keys and provided with a rear extension, *d*, to which is pivoted a gravitating dog, *e*, which engages with the toothed wheel Q of the registering-wheel N in such manner that whenever any of the odd-numbered keys from 15 to 95, inclusive, are operated the bar A′ is depressed and the dog *e* actuated to turn the wheel N one notch and thereby register five cents on said wheel. At the same time, as before explained, the tens of these odd-numbered keys are registered on the wheel O. The five-cent key is pivoted on the shaft B outside of the wheel N. It is not provided with any arm Z nor otherwise connected to the vibrating dog-

carrier; but the five-cent bar A′ extends under the forward end of this key and is depressed by each operation of the key, and its dog *e* at each operation of the key turns the wheel N one notch and registers five cents thereon. If desired, however, the five-cent key may have an arm Z pivoted to it and connected to a vibrating dog hung upon the shaft L and engaging with the teeth of the disk Q on the wheel N, so that upon operating the five-cent key the wheel N will be turned one notch to register five cents. In such case the five-cent bar A′ need not extend under the five-cent key.

The next group of keys is between the wheels O and P, and consists of the keys indicating multiples of ten from 10 to 90, inclusive. They are provided with a second set of arms, Z′, pivoted to the keys at points unequally distant from the fulcrum of the keys and connected to a second vibrating dog-carrier, B′, provided with a pivoted dog, (not shown,) engaging with the toothed wheel T of the registering-wheel O, these arms Z′ and dog-carrier B′ corresponding in construction and relative arrangement to those previously described, so that upon operating any key of this group the dog-carrier B′ is vibrated to an extent sufficient to turn the wheel O the exact number of notches necessary to register the value of such key upon said wheel.

Instead of having two toothed disks, S T, secured to the wheel O, with an independent dog-carrier and dog for each disk, one of said dog-carriers being connected to the group of keys indicating odd multiples of five above the first power and the other to the group indicating even multiples of five, the wheel O may be provided with only one toothed disk and one dog-carrier and dog for actuating it. In such case the dog-carrier would extend laterally on each side of the wheel O, with its dog located near its center, and would
287 be connected on one side by the arms Z to the group of keys representing odd multiples of five above the first power and on the other by the arms Z′ to the group indicating even multiples of five, and it would be vibrated by the operation of any key of either group to cause its dog to actuate the registering-wheel O, as will be readily understood.

The remaining group of keys, indicating dollars, in this instance 1, 2, 3, 4, 5, and 10, is located between the registering-wheel P and the frame of the machine, and through the medium of a third set of arms, Z″, and a third vibrating dog-carrier, C′, provided with a dog, *f*, engaging with the toothed disk R of the wheel P, the value of each of these keys is registered on said wheel, as will be readily understood.

The arms Z, Z′, and Z″, instead of being pivoted to the operating-keys of their respective groups at points unequally distant from the fulcrum of said keys, may, to accomplish the same result, be connected to said keys at points equally distant from their fulcrum and have the slots in their upper ends made of unequal length, the lengths of the slots being so adjusted that upon operating any key of a group the bottom wall of the slot in its arm will engage with the shaft of the vibrating dog-carrier at such time as to cause the dog of said carrier to actuate the registering-wheel just sufficiently

to register the value of the key operated, as will be readily understood.

The feature of our invention relating to the combination of the five-cent-registering wheel, the ten-cent-registering wheel, the operating-keys, and the five-cent bar is not confined in its application to the machine we have shown and described. It is applicable to other machines which are provided with a five-cent-registering wheel and a ten-cent-registering wheel actuated by a series of keys, whether the connecting mechanism between the keys and the ten-cent wheel be similar to that which we have shown and described or not.

It will also be understood that our invention is not limited to the particular form of the five-cent bar which we have shown and described, it being only necessary that the odd-numbered keys be connected to the five-cent wheel in such manner as to actuate it at each operation of any one of them.

To prevent the registering-wheels by a violent operation of the machine from being revolved more than the exact number of notches necessary to register the value of the key operated, we provide brake mechanism, as follows: A rock-shaft, D′, is journaled in the secondary frame across the top of the registering-wheels, and is provided between the wheels N and O with an arm, E′, connected by a pivoted link, F′, to a rearwardly-extending arm, G′, rigidly connected to or formed integral with the five-cent bar A′. Likewise secured to the shaft D′ are two dogs, H′ I′, the former of which is over the toothed disk Q and the latter over the toothed disk S. The arm E′ and the dogs H′ I′ are so adjusted that whenever any key of the first group is operated the vibration of the bar A′ will throw up the rear end of the arm G′ and cause the oscillation of the rock-shaft D′ through the medium of the link F′ to cause the dogs H′ I′ to simultaneously engage with the teeth of the disks Q and S just at the completion of the stroke of the key, thereby forming a positive stop to the registering-wheels N and O and causing the exact amount of the key operated to be registered. The second and third groups of keys are similarly provided with vibrating bars J′ K′, hung upon the fulcrum-shaft B and having rearward integral extensions L′ M′, with pivoted links N′ O′ connecting them to arms P′ Q′, secured to sleeves R′ S′, loose upon the shaft D′. The sleeve R′ is provided with a brake-dog, T′, located over the toothed disk T, and the sleeve S′ is provided with a similar dog, U′, over the toothed disk R in such manner that whenever any key of the second or third group is operated its sleeve will be partially rotated to cause its dog to engage with its corresponding toothed disk, for the purpose before explained. In addition to these brake-dogs there are ordinary weighted holding-dogs, V′, hung loosely upon the shaft D′, one for each of the disks Q R T, and engaging with the teeth thereof, and which, if desired, may be provided with springs, one of which is shown applied to the dog for the disk Q in Figs. 1 and 4.

The bars J′ K′, while they correspond in appearance to the five-cent bar A′, perform no other function than to operate the brake-dogs. It will be observed that the front ends of the arms G′ L′ M′ extend over the vibrating frame J, by means of which the bars A′,

J′, and K′ are reset to their normal position after each operation of the key of their respective groups.

While we have shown and described the brake-dogs for the second and third groups of keys as secured to sleeves loose upon the shaft D′, in order that the brake-dogs may be independent in their operation, yet, if desired, the construction may be simplified by securing all of the brake-dogs directly to the shaft D′ and dispensing with the sleeves R′ S′. In such case the bars I′ K′ and two of the arms G′ L′ M′ and two of the arms E′ P′ Q′ might also be dispensed with, the remaining arm G′, L′, or M′ being secured directly to the main vibrating frame J. Under such construction all of the brake-dogs would be operated simultaneously by the depression of any key.

It will be understood that this brake mechanism is applicable to other cash-registers which are provided with similar registering-wheels operated by a series of pivoted keys, whether the connecting mechanism between the keys and registering-wheels corresponds to that which we have shown and described or not.

Secured to the secondary frame is a plate, W′, extending across all of the registering-wheels in close proximity thereto, and
288 provided with three reading-openings, *g*, through each of which but a single number on the registering-wheel can be seen. In order to increase the registering capacity of the machine, a toothed disk, *h*, is pivoted upon the under side of the plate W′, one by the side of each reading-opening, in such manner that one tooth of each disk is exposed through its corresponding reading-opening between the end of the reading-opening and the number on the registering-wheel. Each disk *h* is yieldingly held from rotation by a spring-pressed dog, *i*, pivoted to the plate, as seen in Fig. 11.

Each of the registering-wheels N O P is provided with a projecting pin, *j*′, that on the wheel N being located in the space between 0 and 4.95, that on the wheel O between 0 and 9.90, and that on the wheel P between 0 and 99. At every complete revolution of one of the registering-wheels its pin comes in contact with a tooth of its corresponding disk *h* and turns said disk to expose the next tooth through the reading-opening. Each tooth of these disks *h* bears a number, the numbers on the disk actuated by the wheel N being multiples of five from 0 to 70 and indicating dollars, those on the second and third disks *h* being multiples of one from 0 to 14 and indicating tens and hundreds of dollars, respectively.

Supposing all the registering-wheels and disks to be set at 0, as the numbers on the wheel N are multiples of five from 0 to 4.95, inclusive, upon a complete revolution of this wheel its pin *j* turns the corresponding disk *h* one notch and exposes a tooth bearing the number 5, indicating five dollars. Upon a second complete revolution of the registering-wheel, the next tooth of the disk *h*, bearing the number 10, is exposed through the reading-opening and indicates ten dollars. The total amount registered on this wheel N and its disk *h* at any given time is ascertained by adding together the amount indicated by the number on the tooth of the disk *h* exposed

through the reading-opening and the amount indicated by the number on the registering-wheel N which is exposed through the reading-opening at the same time. Thus, if the number on the tooth be 10 and that on the wheel 4.95, it will indicate that fourteen dollars and ninety-five cents has been registered. If the wheel N be then turned one notch farther, its 0 will be exposed, while its pin *j* will have turned the disk *h* one notch and a tooth bearing the number 15 will be exposed, and a total of fifteen dollars indicated. Upon one complete revolution of the wheel O, whose numbers are multiples of ten from 0 to 9.90, inclusive, its disk *h* will be turned, and a tooth bearing the number 1 exposed through the reading-opening. At the same time 0.00 will appear through the reading-opening on the registering-wheel, and with the tooth bearing the number 1 at the immediate left of the 0.00 the amount of $10.00 is clearly indicated. If the wheel O be operated until its number 9.90 be exposed through the reading-opening, this number, with the tooth bearing the number 1 still exposed on the immediate left, will readily indicate $19.90. If the wheel O be then turned one notch farther, 0.00 will again appear through the reading-opening, while its disk *h* will be turned to expose a tooth bearing the number 2, and thus $20.00 will be clearly indicated. It will thus be seen that the total amount registered on this wheel O and its disk *h* is always clearly indicated by the numbers exposed through the reading-opening by mere numerical reading, without the necessity of any addition. The same is true of the registering-wheel P, whose numbers are multiples of one from 0 to 99, inclusive. Upon a complete revolution of this wheel its disk *h* will be turned to expose the tooth bearing the number 1, while 00 will appear on the registering-wheel, thus indicating $100. If the wheel P be further operated until its number 99 is exposed, the tooth bearing the number 1 will continue exposed on the immediate left of the 99, and thus $199 will be indicated. Upon turning the wheel P one notch farther its disk *h* will be turned to expose a tooth bearing the number 2, while 00 will again appear on the registering-wheel, and $200 be thus indicated.

The disks *h* are readily reset to 0 at any time by means of the thumb-pieces *k*.

The numbered teeth on the disks *h* might be omitted and the numbers placed on the body of the disk, in which event, if only one reading-opening were provided for each disk, its edge should project far enough under the reading-opening to expose one of its numbers at a time through said opening, and the under side of its edge should be provided with a series of projections or teeth to engage with the pin on the registering-wheel. Furthermore, each registering-wheel might be provided with two or more similar series of numbers, with a projecting pin between each series, in which event the numbers on its disk *h* would be multiples of the amount of each of such series. Thus the wheel N might have five series of numbers, each series being multiples of five from 0 to 95 inclusive, with a projecting pin between each series, so that the disk *h* for this wheel would be turned one notch for every dollar registered on the wheel N. The numbers on the disk *h* should then be multiples of

one and indicate dollars. In this manner the number on the disk *h* and that on the wheel N which were exposed through the reading-opening at the same time would always indicate the exact amount registered on said wheel and disk by mere numerical reading without any addition.

By having only ten notches on this disk *h*, numbered from 0 to 9, inclusive, and providing an additional disk *h* with ten notches numbered from 0 to 9, inclusive, and indicating tens of dollars, to be turned one notch for every complete revolution of the first disk *h*, any amount less than one hundred dollars registered on the wheel N and the two disks *h* might be read off at a glance
289 without any addition, and by providing a third disk with similar notches and numbers any amount less than a thousand dollars would be indicated in numerical order in a similar manner.

Another feature of our invention relates to devices for preventing the operation of two or more keys of a group at the same time, for in machines of this class, where a single registering-wheel is operated by a series of keys of different values, when two or more keys of a group are operated simultaneously the key of the highest value operated is the only one which actuates the registering-wheel, and thus the value of the other key or keys operated simultaneously with it is not registered at all. As a tablet is exposed for each of the two or more keys operated, while the value of only one is registered, without some means of preventing the operation of more than one key at a time a dishonest attendant will be able to register and account for a less amount of cash than he actually receives, while correctly indicating to the customers or third parties, by means of the exposed tablets, the actual amount he has received. By reference to Figs. 8 and 12 one form of device for preventing the simultaneous operation of two or more keys of a group will be seen, and may be thus described:

Suitably pivoted, as at *l*, to the rear part of the frame of the machine are a number of pendent stops, *m*, whose lower edges, just over the rear ends of the keys, are wedge-shaped, as shown. These stops are arranged in as many independent sets as there are independent series or groups of keys—in this instance one set for the dollar-keys and one set for the cent-keys—and they prevent the upward passage of more than one key of a group at a time. For instance, to register five dollars the operator could not depress the four-dollar and the one-dollar keys simultaneously to expose the four-dollar and the one-dollar tablets, (which action would only register four dollars,) but is compelled to operate the five-dollar key and expose the five-dollar tablet, and thereby register five dollars. Upon the operation of any single key of a group the two stops *m* directly above it would be spread apart to permit the passage between them of the ascending rear end of the key. Upon attempting, however, to operate two keys simultaneously, if they be non-adjacent keys, the intermediate stops would be crowded together and prevent the passage of either key, and if they be adjacent keys the intermediate stop would be equally pressed by both, and thus

locked to prevent the passage of either key, as will be readily understood.

This feature of our invention is not confined in its application to the machine we have here shown and described. It is applicable to other cash-registers, but more especially to those whose registering mechanism is of such construction that the operation of two or more keys simultaneously causes the value of the highest one only to be registered. Nor is this feature of our invention limited to the particular form and arrangement of the stops we have shown and described. For instance, the lower ends of the stops, instead of being wedge-shaped, might be rounded or of other suitable shape to permit the passage of one key, but prevent the simultaneous passage of two or more. Again, the stops might be of a similar shape to those shown, but pivoted below the keys and extend up between them. When a single key was operated, it would push the stops aside to permit its passage, but when it was attempted to operate two keys, if they were adjacent they would become locked on the inclined sides of the intermediate stop, and if they were non-adjacent the intermediate stops would be crowded together to prevent their passage. It is also evident that the stops might be arranged to engage with the keys at other points than the rear ends.

Another feature of our invention (illustrated in Figs. 5 and 6) relates to an automatic lock to prevent the operation of any key of the machine while the cash-drawer is open. A bar, *u*, is pivoted, as at *o*, to the frame of the machine and extends down into the drawer-compartment by the side of the drawer, as shown. The drawer *p*, which is arranged, as is customary in this class of machines, to be unlocked and partially propelled from the case by a weight or spring whenever any key is depressed, is provided with a pin or stud, *q*, upon its side. The bar *u* and the pin *q* are so located that when the drawer is pushed in and locked the pin *q* will press back the lower end of the bar *u*, and thereby throw its upper end out of the way of the front end of the vibrating frame J. Upon the operation of any key and the propulsion of the drawer from the case the bar *u* will by gravity assume the position shown by the dotted lines in Fig. 5, thereby bringing its upper end directly under the vibrating frame and forming a lock to prevent the depression of said frame until, the drawer having been pushed in and again locked, the bar *u* will be swung by the pin *q* out of the way of the vibrating frame. In order that the proprietor may, when desired, throw this bar *u* permanently out of action, as during a rush of business, an ordinary key, *r*, is provided, which, when inserted through an opening provided in the side of the case and turned, will catch the bar *u* and swing it and hold it out of the way of the frame J, as seen in Fig. 6. As seen in Figs. 3 and 13, the bell-trip is composed of a single bar, *s*, pivoted, as at *t*, to the lower part of the vibrating frame J, and extending rearwardly and upwardly and then back into engagement with a pin, *u*, on the gong-hammer *v*. The under side of the bell-trip is beveled off, as seen in Fig. 13 and by the dotted line in Fig. 3, and the release of the gong-hammer is effected by this beveled portion riding up on a block, *w*, so placed that just

at the completion of the stroke of the key the end of the trip will have been disengaged from the pin *a* to permit the gong-
290 hammer to strike the gong and the wing, which has been pushed backward by the gong-hammer, to reset itself.

The novel features herein shown and described and not claimed, as well as the various modifications in construction which have been described, are hereby reserved for a future application, to be presently filed.

Having thus fully described our invention, we claim—

1. In a cash register and indicator, the combination, with a registering-wheel and a dog for actuating said wheel, of a series of pivoted keys, a series of arms secured to said keys at points unequally distant from the fulcrum of said keys, and mechanism connecting all of said arms to said actuating dog, whereby the operation of any one of said keys causes said dog to actuate the registering-wheel to register the value of such key, substantially as described.

2. In a cash register and indicator, the combination, with a registering-wheel and a series of operating-keys, of a vibrating dog-carrier provided with a dog for actuating said registering-wheel, and a series of arms secured at their lower ends to said keys and provided at their upper ends with slots which embrace said vibrating dog-carrier, whereby upon operating any one of said keys its arm vibrates the dog-carrier to cause its dog to actuate the registering-wheel to register the value of such key, substantially as described.

3. In a cash register and indicator, the combination, with a registering wheel and a series of pivoted operating keys, of a vibrating dog-carrier provided with a dog for actuating said registering-wheel, and a series of arms pivoted to said keys at points unequally distant from the fulcrum of said keys and connecting said keys with the vibrating dog-carrier, whereby upon operating any one of said keys its arm vibrates the dog-carrier to cause its dog to actuate the registering-wheel to register the value of such key, substantially as described.

4. In a cash register and indicator, the combination, with a registering-wheel and a series of pivoted operating-keys, of a vibrating dog-carrier provided with a dog for actuating said registering-wheel, and a series of arms pivoted at their lower ends to said keys at points unequally distant from the fulcrum of said keys and provided at their upper ends with slots which embrace said vibrating dog-carrier, whereby upon operating any one of said keys its arm vibrates the dog-carrier to cause its dog to actuate the registering-wheel to register the value of such key, substantially as described.

5. In a cash register and indicator, the combination, with a registering-wheel and a series of pivoted operating-keys, of a vibrating dog-carrier pivoted concentric with the axis of the registering-wheel and provided with a dog for actuating said wheel, and a series of arms pivoted at their lower ends to said keys and engaging at their upper ends directly with said dog-carrier for communicating different degrees of movement thereto, accordingly as one or another of the keys is operated, substantially as described.

6. In a cash register and indicator, the combination, with a registering-wheel and a series of keys, of a vibrating dog-carrier hung concentric with said registering-wheel and provided with a dog for actuating said wheel, and a series of arms pivoted at their lower ends to said keys and provided at their upper ends with slots which embrace said vibrating dog-carrier, whereby upon operating any one of said keys its arm vibrates the dog-carrier to cause its dog to actuate the registering-wheel to register the value of such key, substantially as described.

7. In a cash register and indicator, the combination, with a registering-wheel and a series of pivoted keys, of a vibrating dog-carrier hung concentric with said registering-wheel and provided with a dog for actuating said wheel, and a series of arms pivoted at their lower ends to said keys at points unequally distant from the fulcrum of said keys and connected at their upper ends with said vibrating dog-carrier, whereby upon operating any one of said keys its arm vibrates the dog-carrier to cause its dog to actuate the registering-wheel to register the value of such key, substantially as described.

8. In a cash register and indicator, the combination, with a registering-wheel and a series of pivoted operating-keys, of a vibrating dog-carrier hung concentric with said registering-wheel and provided with a dog for actuating said wheel, and a series of arms pivoted to said keys at points unequally distant from the fulcrum of said keys and provided at their upper ends with slots engaging with said vibrating dog-carrier, whereby upon operating any one of said keys its arm vibrates the dog-carrier to cause its dog to actuate the registering-wheel to register the value of such key, substantially as described.

9. In a cash register and indicator, the combination of a series of keys indicating odd multiples of five above the first power, a ten-cent-registering wheel actuated by each of said keys, a five-cent-registering wheel, and connecting mechanism between all of said keys and five-cent-registering wheel, whereby upon operating any one of said keys the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

10. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a dog for actuating said ten-cent wheel, of a series of operating-keys indicating odd multiples of five above the first power, connecting mechanism between all of said keys and actuating-dog, and connecting mechanism between all of said keys and the five-cent-registering wheel, whereby upon operating any one of said keys the tens of its
291 value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

11. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a vibrating dog-carrier and dog for actuating said ten-cent wheel, of a series of operating-keys indicating odd multiples of five above the first power, connecting mechanism between said keys and vibrating dog-carrier, and connecting mechanism between said keys and the five-

cent-registering wheel, whereby upon operating any one of said keys the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

12. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a vibrating dog-carrier and dog for actuating said ten-cent wheel, of a series of operating-keys indicating odd multiples of five above the first power, a series of arms connecting said keys and vibrating dog-carrier, and connecting mechanism between said keys and the five-cent-registering wheel, whereby upon operating any one of said keys the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

13. In a cash register and indicator, the combination, with a five-cent-registering wheel and a ten cent-registering wheel, of a series of operating-keys indicating odd multiples of five above the first power, connecting mechanism between all of said keys and the ten-cent-registering wheel, and a five-cent bar actuated by all of said keys and arranged to actuate the five-cent-registering wheel, whereby upon operating any one of said keys the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

14. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a dog for actuating the ten-cent wheel, of a series of operating-keys indicating odd multiples of five above the first power, connecting mechanism between all of said keys and actuating-dog, and a five-cent bar actuated by all of said keys and arranged to actuate the five-cent-registering wheel, whereby upon operating any one of said keys the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

15. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a dog for actuating the ten-cent wheel, of a series of operating-keys indicating odd multiples of five above the first power, a series of arms secured to said keys, connecting mechanism between said arms and actuating-dog, and a five-cent bar actuated by said keys and arranged to actuate the five-cent-registering wheel, whereby upon operating any one of said keys the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

16. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a dog for actuating the ten-cent wheel, of a series of pivoted operating-keys indicating odd multiples of five above the first power, a series of arms pivoted to said keys at points unequally distant from the fulcrum of said keys, connecting mechanism between said arms and actuating-dog, and a five-cent bar actuated by said keys and arranged to actuate the five-cent-registering wheel, whereby upon operating any one of said keys the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

17. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a vibrating dog-carrier and dog for actuating the ten-cent wheel, of a series of operating-keys indicating odd multiples of five above the first power, connecting mechanism between said keys and vibrating dog-carrier, and a five-cent bar actuated by said keys and arranged to actuate the five-cent wheel, whereby upon operating any one of said keys the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

18. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a vibrating dog-carrier and dog for actuating the ten-cent wheel, of a series of operating-keys indicating odd multiples of five above the first power, a series of arms connecting said keys and dog-carrier, and a five-cent bar actuated by said keys and arranged to actuate the five-cent-registering wheel, whereby upon operating any one of said keys the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

19. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a vibrating dog-carrier and dog for actuating the ten-cent wheel, of a series of pivoted operating-keys indicating odd multiples of five above the first power, a series of arms pivoted to the keys at points unequally distant from the fulcrum of the keys and connecting said keys with the vibrating dog-carrier, and a five-cent bar arranged to actuate the five-cent wheel, whereby upon operating any one of said keys the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

20. In a cash register and indicator, the combination of a series of operating-keys indicating even multiples of five, another series of keys indicating odd multiples of five above the first power, a ten-cent-registering wheel and connecting mechanism between said wheel and all of the keys of both series, a five-cent-registering wheel, and connecting mechanism between said wheel and
292 all the keys of the odd-numbered series, whereby upon operating an even-numbered key its value is registered on the ten-cent wheel, and whereby upon operating an odd-numbered key the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

21. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a dog for actuating said ten-cent wheel, of a series of operating-keys indicating both even and odd multiples of five above the first power, connecting mechanism between all of said keys and actuating-dog, and connecting mechanism between each of said odd-numbered keys and the five-cent-registering wheel, whereby upon operating an even-numbered key its value is registered on the ten-cent wheel, and whereby upon operating an odd-numbered key the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

22. In a cash register and indicator, the combination, with a five-

cent-registering wheel, a ten-cent-registering wheel, and a vibrating dog-carrier and dog for actuating said ten-cent wheel, of a series of operating keys indicating both even and odd multiples of five above the first power, connecting mechanism between said keys and vibrating dog-carrier, and connecting mechanism between each of said odd-numbered keys and the five-cent-registering wheel, whereby upon operating an even-numbered key its value is registered on the ten-cent wheel, and whereby upon operating an odd-numbered key the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

23. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a vibrating dog-carrier and dog for actuating the ten-cent wheel, of a series of operating keys indicating both even and odd multiples of five above the first power, a series of arms connecting said keys with the vibrating dog-carrier, and connecting mechanism between each of the odd-numbered keys and the five-cent-registering wheel, whereby upon operating an even-numbered key its value is registered on the ten-cent wheel, and whereby upon operating an odd-numbered key the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

24. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a vibrating dog-carrier and dog for actuating the ten-cent-wheel, of a series of pivoted operating keys indicating both even and odd multiples of five above the first power, a series of arms secured to said keys at points unequally distant from the fulcrum of said keys and connecting them with the vibrating dog-carrier, and connecting mechanism between each of the odd-numbered keys and the five-cent-registering wheel, whereby upon operating an even-numbered key its value is registered on the ten-cent wheel, and whereby upon operating an odd-numbered key the tens of its value are registered on a ten-cent wheel and the five on the five-cent wheel, substantially as described.

25. In a cash register and indicator, the combination of a series of operating-keys indicating even multiples of five, another series of keys indicating odd multiples of five above the first power, a ten-cent-registering wheel, and connecting mechanism between said wheel and all the keys of both series, a five-cent-registering wheel, and a five-cent bar actuated by each of the odd-numbered keys and arranged to actuate the five-cent-registering wheel, whereby upon operating an even-numbered key its value is registered on the ten-cent wheel, and whereby upon operating an odd-numbered key the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

26. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a dog for actuating said ten-cent wheel, of a series of operating keys indicating both even and odd multiples of five above the first power, connecting mechanism between all of said keys and actuating-dog, and a five-cent bar actuated by the keys indicating odd multiples of five

and arranged to actuate the five-cent wheel, whereby upon operating an even-numbered key its value is registered on the ten-cent wheel, and whereby upon operating an odd-numbered key the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

27. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a vibrating dog-carrier and dog for actuating said ten-cent wheel, of a series of operating-keys indicating both even and odd multiples of five above the first power, connecting mechanism between said keys and vibrating dog-carrier, and a five-cent bar actuated by the keys indicating odd multiples of five and arranged to actuate the five-cent-registering wheel, whereby upon operating an even-numbered key its value is registered on the ten-cent wheel, and whereby upon operating an odd-numbered key the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

28. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a vibrating dog-carrier and dog for actuating the ten-cent wheel, of a series of operating-keys indicating both even and odd multiples of five above the first power, a series of arms connecting said keys with the vibrating dog-carrier, and a five-cent bar actuated by the keys indicating odd multiples of five and arranged to actuate the five-
293 cent wheel, whereby upon operating an even-numbered key its value is registered on the ten-cent wheel, and whereby upon operating an odd-numbered key the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

29. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a vibrating dog-carrier and dog for actuating the ten-cent wheel, of a series of pivoted operating-keys indicating both even and odd multiples of five above the first power, a series of arms pivoted to said keys at points unequally distant from the fulcrum of said keys and connecting said keys with the vibrating dog-carrier, and a five-cent bar actuated by the keys indicating odd multiples of five and arranged to actuate the five-cent wheel, whereby upon operating an even-numbered key its value is registered on the ten-cent wheel, and whereby upon operating an odd-numbered key the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

30. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a vibrating dog-carrier and dog for actuating the ten-cent wheel, of a series of operating-keys indicating five and the odd multiples thereof, connecting mechanism between said vibrating dog-carrier and each of said keys excepting the five-cent key, and a five-cent bar actuated by said keys and provided with a dog engaging with the five-cent wheel, whereby upon operating the five-cent key its value is registered on the five-cent wheel, and upon operating any other one of

the keys the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

31. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a vibrating dog-carrier and dog for actuating the ten-cent wheel, of a series of operating-keys indicating five and the odd multiples thereof, a series of arms connecting said dog-carrier to all of the keys excepting the five-cent key, a five-cent bar actuated by each of the keys and provided with a dog engaging with the five-cent wheel, whereby upon operating the five-cent key its value is registered on the five-cent wheel, and upon operating any other one of the keys the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

32. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a vibrating dog-carrier and dog for actuating the ten-cent wheel, of a series of operating-keys indicating five and the even and odd multiples thereof, a series of arms connecting said dog-carrier to all of the keys excepting the five-cent key, and a five-cent bar actuated by each of the odd-numbered keys and provided with a dog engaging with the five-cent wheel, whereby upon operating the five-cent key its value is registered on the five-cent wheel, and upon operating any other one of the odd-numbered keys the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, and whereby upon operating an even-numbered key its value is registered on the ten-cent wheel, substantially as described.

33. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a vibrating dog-carrier and dog for actuating the ten-cent wheel, of a series of pivoted operating-keys indicating five and the even and odd multiples thereof, a series of arms secured to all of said keys excepting the five-cent key at points unequally distant from the fulcrum of said keys and connecting said keys with the vibrating dog-carrier, and a five-cent bar actuated by each of the odd-numbered keys provided with a dog engaging with the five-cent wheel, whereby upon operating the five-cent key its value is registered on the five-cent wheel, and upon operating any other one of the odd-numbered keys the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, and whereby upon operating an even-numbered key its value is registered on the ten-cent wheel, substantially as described.

34. In a cash register and indicator, the combination, with a series of registering-wheels and a series of vibrating dog-carriers and dogs for actuating said registering-wheels, and each of said dog-carriers being pivoted concentric with the axis of its registering-wheel, of a series of groups of pivoted operating-keys, one group for each registering-wheel, and a series of arms for each group pivoted at their lower ends to the keys of such group and engaging at their upper ends directly with the vibrating dog-carrier of such group for communicating different degrees of motion to said dog-carrier, whereby upon operating any key of a group its arm

vibrates its dog-carrier to actuate its registering-wheel to register the value of such key, substantially as described.

35. In a cash register and indicator, the combination, with a series of registering-wheels and a series of vibrating dog-carriers and dogs for actuating said registering wheels, of a series of groups of pivoted operating-keys, one group for each registering-wheel, and a series of arms pivoted to said keys at points unequally distant from the fulcrum of said keys and connecting the keys of each group with the vibrating dog-carrier of such group, whereby upon operating any key of a group its arm vibrates its dog-carrier to actuate the registering-wheel to register the value of such key, substantially as described.

36. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, a dollar-registering wheel, and vibrating dog-carriers and dog for actuating
294 the ten-cent and dollar registering wheels, of a series of operating-keys indicating cents in even and odd multiples of five above the first power, a series of keys indicating dollars in multiples of one, connecting mechanism between the cent-keys and the vibrating dog-carrier of the ten-cent wheel, and connecting mechanism between the dollar-keys and the vibrating dog-carrier of the dollar-wheel, and a five-cent bar actuated by the cent-keys, indicating odd multiples of five and arranged to actuate the five-cent-registering wheel, whereby upon operating any odd-numbered cent-key the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, whereby upon operating any even-numbered cent-key its value is registered on the ten-cent wheel, and whereby upon operating any dollar-key its value is registered on the dollar-wheel, substantially as described.

37. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, and a dollar-registering wheel, and vibrating dog-carriers and dogs for actuating the ten-cent and dollar registering wheels, of a series of operating-keys indicating cents in even and odd multiples of five above the first power, a series of keys indicating dollars in multiples of one, a series of arms connecting the cent-keys to the vibrating dog-carrier of the ten-cent wheel, and a series of arms connecting the dollar-keys to the vibrating dog-carrier of the dollar-wheel, and a five-cent bar actuated by the cent-keys indicating odd multiples of five and arranged to actuate the five-cent-registering wheel, substantially as and for the purpose set forth.

38. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, a dollar-registering wheel, and vibrating dog-carriers and dogs for actuating the ten-cent and dollar registering wheels, of a series of pivoted operating-keys indicating cents in even and odd multiples of five above the first power, a series of pivoted keys indicating dollars in multiples of one, a series of arms pivoted to the cent-keys at points unequally distant from the fulcrum of said keys and connecting said keys to the vibrating dog-carrier of the ten-cent wheel, a series of arms pivoted to the dollar-keys at points unequally distant from

the fulcrum of said keys and connecting said keys to the vibrating dog-carrier of the dollar-wheel, and a five-cent bar actuated by the cent-keys indicating odd multiples of five and arranged to actuate the five-cent-registering wheel, substantially as and for the purpose set forth.

39. In a cash register and indicator, the combination, with a registering-wheel provided with teeth, a series of keys pivoted on a horizontal shaft at the front of the machine for actuating said wheel, and a vibrating bar pivoted on said shaft and actuated by the operation of any one of said keys, of a brake-dog arranged to engage with the teeth of said wheel, and connecting mechanism between said brake-dog and vibrating bar, whereby upon the operation of any one of said keys the brake-dog is actuated to engage with the teeth of the registering-wheel and form a positive stop therefor, substantially as described.

40. In a cash register and indicator, the combination, with a registering-wheel provided with teeth, a series of keys pivoted on a horizontal shaft at the front of the machine for actuating said wheel, and a vibrating bar pivoted on said shaft and actuated by the operation of any one of said keys, of a rock-shaft, a brake-dog secured thereto and arranged to engage with the teeth of said wheel, and connecting mechanism between said rock-shaft and vibrating bar, whereby upon the operation of any one of said keys the rock-shaft is oscillated to cause its brake-dog to engage with the teeth of said wheel, substantially as described.

41. In a cash register and indicator, the combination, with a registering-wheel provided with teeth, a series of keys for actuating said wheel, and a vibrating bar provided with a rearward extension and arranged to be actuated by the operation of any one of said keys, of a rock-shaft, a brake-dog secured to said rock-shaft and arranged to engage with the teeth of the registering-wheel, an arm secured to said rock-shaft, and a link connecting said arm and the rearward extension of the vibrating bar, whereby upon operating any one of said keys said rock-shaft is oscillated to cause its brake-dog to engage with the teeth of the registering-wheel, substantially as described.

42. In a cash register and indicator, the combination, with a registering-wheel provided with teeth, a vibrating dog-carrier and dog for actuating said wheel, a series of operating-keys, and a series of arms secured to said keys and independently connecting each of them to said vibrating dog-carrier, of a brake-dog arranged to engage with the teeth of the registering-wheel, a vibrating bar actuated by the operation of any of said keys, and connecting mechanism between said vibrating bar and brake-dog, substantially as and for the purpose described.

43. In a cash register and indicator, the combination, with a registering-wheel provided with teeth, a vibrating dog-carrier and dog for actuating said wheel, a series of pivoted operating-keys, and a series of arms pivoted to said keys at points unequally distant from the fulcrum of said keys and connecting said keys with the vibrating dog-carrier, of a brake-dog arranged to engage with the

teeth of the registering-wheel, a vibrating bar actuated by the operation of any one of said keys, and connecting mechanism between said vibrating bar and brake-dog, substantially as and for the purpose described.

44. In a cash register and indicator, the combination, with a registering-wheel provided with teeth, a vibrating dog-carrier and dog for actuating said wheel, a series of operating-keys, and
295 a series of arms connecting said keys and vibrating dog-carrier, of a rock-shaft, a break-dog secured to the rock-shaft and arranged to engage with the teeth of the registering-wheel, an arm secured to said rock-shaft, a vibrating bar actuated by the operation of any one of said keys, and connecting mechanism between said vibrating bar and arm, substantially as and for the purpose described.

45. In a cash register and indicator, the combination, with a registering-wheel provided with teeth, a vibrating dog-carrier and dog for actuating said wheel, a series of pivoted operating-keys, and a series of arms pivoted to said keys at points unequally distant from the fulcrum of said keys and connecting the keys with the vibrating dog-carrier, of a rock-shaft, a brake-dog secured to said rock-shaft and arranged to engage with the teeth of the registering-wheel, an arm secured to said shaft, a vibrating bar actuated by the operation of any one of said keys, and connecting mechanism between said vibrating bar and arm, substantially as and for the purpose described.

46. In a cash register and indicator, the combination, with a series of registering-wheels provided with teeth, a vibrating dog-carrier and dog for each wheel, a series of groups of operating-keys, one group for each wheel, and a series of arms connecting the keys of each group with the vibrating dog-carrier of its registering-wheel, of a rock-shaft journaled in the frame of the machine and extending across all of the registering-wheels, a series of brake-dogs, one for each wheel, supported on said rock-shaft and each arranged to engage with the teeth of its registering-wheel, an arm secured to said rock-shaft, a vibrating bar actuated by the depression of any key, and connecting mechanism between said bar and the arm secured to the rock-shaft, substantially as and for the purpose described.

47. In a cash register and indicator, the combination, with a registering-wheel provided with teeth, a vibrating dog-carrier and dog for actuating said wheel, a series of operating-keys, and a series of arms connecting said keys and the vibrating dog-carrier, of a shaft, a sleeve loose upon said shaft, a brake-dog secured to said sleeve and arranged to engage with the teeth of the registering-wheel, an arm secured to said sleeve, a vibrating bar actuated by the operation of any of said keys, and connecting mechanism between the vibrating bar and the arm secured to the sleeve, substantially as and for the purpose described.

48. In a cash register and indicator, the combination, with a series of registering-wheels provided with teeth, a vibrating dog-carrier and dog for each wheel, a series of groups of operating-keys,

one group for each wheel, and a series of arms connecting the keys of each group with the vibrating dog-carrier of its registering-wheel, of a shaft extending across said registering-wheels, a series of sleeves loose upon said shaft, one sleeve for each registering-wheel, a brake-dog secured to each sleeve and arranged to engage with the teeth of its registering-wheel, an arm secured to each sleeve, a vibrating bar for each group of keys and actuated by the operation of any key of its group, and connecting mechanism between the vibrating bar and the arm secured to its corresponding sleeve, substantially as and for the purpose described.

49. In a cash register and indicator, the combination of a registering-wheel bearing one or more series of numbers on its periphery, a vibrating dog-carrier and dog for actuating said wheel, a series of operating-keys, a series of arms connecting said keys and vibrating dog-carrier, a supplemental registering-disk arranged in a plane tangential to the periphery of the registering-wheel and adjacent thereto and bearing a series of numbers in multiples of the amount registered by each series of numbers on the registering-wheel, and a projection on said registering-wheel for each series of numbers, arranged to engage with said disk and turn it one number for each complete series of numbers on said wheel, substantially as described.

50. In a cash register and indicator, the combination of a registering-wheel bearing one or more series of numbers on its periphery and a reading-opening through which said numbers are exposed one at a time, a vibrating dog-carrier and dog for actuating said wheel, a series of pivoted operating-keys, a series of arms pivoted at their lower ends to said keys at points unequally distant from the fulcrum of said keys and connecting said keys with the vibrating dog-carrier, a supplemental registering-disk arranged in a plane tangential to the periphery of the registering-wheel and adjacent thereto and bearing a series of numbers in multiples of the amount registered by each series of numbers on the registering-wheel, said numbers being exposed through the reading-opening one at a time, and a projection on the registering-wheel for each series of numbers, arranged to engage with said disk and turn it one number for each complete series of numbers on said registering-wheel, substantially as described.

51. In a cash register and indicator, the combination of a registering-wheel bearing one or more series of numbers on its periphery and a reading-opening through which said numbers are exposed one at a time, a vibrating dog-carrier and dog for actuating said wheel, a series of operating-keys, connecting mechanism between said keys and vibrating dog-carrier, a supplemental registering-disk arranged in a plane tangential to the periphery of the registering-wheel and adjacent thereto and bearing a series of numbers in multiples of the amount registered by each series of numbers on the registering-wheel, said numbers being exposed through the reading-opening one at a time, and a projection on the registering-wheel for each series of numbers, arranged to turn said disk one number for

each series of numbers on said wheel, the numbers on the
296 registering wheel and disk being so arranged that the two numbers exposed through the reading-opening coincide to indicate at all times, without addition, the total amount registered on said wheel and disk, substantially as described.

52. In a cash register and indicator, the combination of a series of registering-wheels, each provided with one or more series of numbers on its periphery, a series of vibrating dog-carriers and dogs, one for each wheel, a series of operating-keys and connecting mechanism between said keys and vibrating dog-carriers, a plate extending across all of said registering-wheels and provided with a series of reading-openings, one for each wheel, through which opening the numbers on its corresponding wheel are exposed one at a time, a series of supplemental registering-disks on the under side of said plate, one for each registering-wheel and arranged adjacent thereto, each provided with a series of numbers in multiples of the amount registered by each series of numbers on its corresponding registering-wheel, said numbers being exposed through its reading-opening one at a time, and a projection on each registering-wheel for each series of numbers on said wheel arranged to engage with and turn its corresponding disk one number for each complete series of numbers on said wheel, substantially as described.

53. In a cash register and indicator, the combination of a series of registering-wheels, each provided with one or more series of numbers on its periphery, a series of vibrating dog-carriers and dogs, one for each wheel, a series of operating-keys, a series of arms pivoted to said keys and connecting them with the vibrating dog-carriers, a plate extending across all of said registering-wheels and provided with a series of reading-openings, one for each wheel, through which opening the numbers on its corresponding wheel are exposed one at a time, a series of supplemental registering-disks on the under side of said plate, one for each registering-wheel and arranged adjacent thereto, each provided with a series of numbers in multiples of the amount registered by each series of numbers on its corresponding registering-wheel, said numbers being exposed through its reading-opening one at a time, and a projection on each registering-wheel for each series of numbers on said wheel, arranged to engage with and turn its corresponding disk one number for each complete series of numbers on said wheel, the numbers on each registering-wheel and its corresponding disk being so arranged that the two numbers exposed through the reading-opening coincide to indicate at all times without addition the total amount registered on said wheel and disk, substantially as described.

54. In a cash register and indicator, the combination of a five-cent-registering wheel, a ten-cent-registering wheel, a dollar-registering wheel, vibrating dog-carriers and dogs for actuating the ten-cent and dollar wheels, a series of operating-keys indicating cents in even and odd multiples of five above the first power, a series of keys indicating dollars in multiples of one, connecting mechanism between the cent-keys and the vibrating dog-carrier of the ten-cent wheel, and connecting mechanism between the dollar-keys and the

vibrating dog-carrier of the dollar-wheel, a five-cent bar actuated by the cent-keys which indicate odd multiples of five and arranged to actuate the five-cent-registering wheel, a plate extending across all of said wheels and provided with a series of reading-openings, one for each wheel, through which openings the numbers on its corresponding wheel are exposed one at a time, a series of supplemental registering-disks on the under side of said plate, one for each registering-wheel and arranged adjacent thereto, each provided with a series of numbers in multiples of the amount registered by each series of numbers on its corresponding registering-wheel, said numbers being exposed through its reading-opening one at a time, and a projection on each registering-wheel for each series of numbers on said wheel, arranged to engage with and turn its corresponding registering-disk one number for each complete series of numbers on said wheel, substantially as described.

55. In a cash register and indicator, the combination, with a series of operating-keys, of a series of stops arranged to permit the operation of one key at a time and to prevent the operation of two or more keys simultaneously, substantially as described.

56. In a cash register and indicator, the combination, with a series of operating-keys, of a series of movable stops arranged to permit the operation of one key at a time and to engage with said keys to prevent the operation of two or more of them simultaneously, substantially as described.

57. In a cash register and indicator, the combination, with a series of operating-keys, of a series of pendent stops pivoted above said keys and arranged to engage therewith to prevent the operation of two or more of them simultaneously, substantially as described.

58. In a cash register and indicator, the combination, with a series of operating-keys, of a series of pendent wedge-shaped stops arranged to engage with said keys to prevent the operation of two or more of them simultaneously, substantially as described.

59. In a cash register and indicator, the combination, with a series of operating-keys, of a series of pendent wedge-shaped stops pivoted above said keys and arranged to engage therewith to prevent the operation of two or more of them simultaneously, substantially as described.

60. In a cash register and indicator, the combination, with a series of operating-keys, of a series of movable stops arranged to be displaced upon the operation of a single key to permit such operation, but locking two or more keys when the latter are attempted to be operated simultaneously, substantially as described.

297 61. In a cash register and indicator, the combination, with a registering-wheel and a series of keys for operating said wheel, of a series of stops arranged to permit the operation of one key at a time, but to at all times prevent the simultaneous operation of two or more keys, substantially as described.

62. In a cash register and indicator, the combination, with a registering-wheel and a series of keys for operating said wheel, of a series of stops arranged to permit the operation of one key at a

time, but by engaging them to at all times prevent the simultaneous operation of two or more keys, substantially as described.

63. In a cash register and indicator, the combination, with a registering-wheel and a series of keys for operating said wheel, of a series of movable stops arranged to permit the operation of one key at a time, but to at all times prevent the simultaneous operation of two or more keys, substantially as described.

64. In a cash register and indicator, the combination, with a registering-wheel and a series of keys for operating said wheel, of a series of pendent wedge-shaped stops arranged to engage with said keys to prevent the operation of two or more of them simultaneously, substantially as described.

65. In a cash register and indicator, the combination, with a registering-wheel and a series of keys for operating said wheel, of a series of pendent stops pivoted above said keys and arranged to engage therewith to prevent the operation of two or more of them simultaneously, substantially as described.

66. In a cash register and indicator, the combination, with a registering-wheel and a series of keys for operating said wheel, of a series of pendent wedge-shaped stops pivoted above said keys and arranged to engage therewith to prevent the operation of two or more of them simultaneously, substantially as described.

67. In a cash register and indicator, the combination, with a registering-wheel and a series of keys for operating said wheel, of a series of movable stops arranged to be displaced upon the operation of a single key to permit such operation, but locking two or more keys when the latter are attempted to be operated simultaneously, substantially as described.

68. In a cash register and indicator, the combination, with a registering-wheel, a vibrating dog-carrier and dog for actuating said wheel, a series of operating-keys, and connecting mechanism between said keys and vibrating dog-carrier, of a series of stops arranged to prevent the operation of two or more of said keys simultaneously, substantially as described.

69. In a cash register and indicator, the combination, with a registering-wheel, a vibrating dog-carrier and dog for actuating said wheel, a series of operating-keys, and a series of arms connecting said keys to the vibrating dog-carrier, of a series of stops arranged to engage with said keys to prevent the operation of two or more of them simultaneously, substantially as described.

70. In a cash register and indicator, the combination, with a series of registering-wheels and a series of groups of keys for operating said wheels, one group of keys for each wheel, of a series of sets of stops arranged to prevent the operation of two or more keys of a group simultaneously, but permitting the simultaneous operation of two or more keys of different groups, substantially as described.

71. In a cash register and indicator, the combination, with a series of registering-wheels and a series of groups of keys for operating said wheels, one group of keys for each wheel, of a series of sets of stops arranged to engage with said keys to prevent the operation of two or more keys of a group simultaneously, but permitting the

simultaneous operation of two or more keys of different groups, substantially as described.

72. In a cash register and indicator, the combination, with a series of registering-wheels and a series of groups of keys for operating said wheels, one group of keys for each wheel, of a series of sets of pendent wedge-shaped stops arranged to engage with said keys to prevent the operation of two or more keys of a group simultaneously, but permitting the simultaneous operation of two or more keys of different groups, substantially as described.

73. In a cash register and indicator, the combination, with a series of registering-wheels and a series of groups of keys for operating said wheels, one group of keys for each wheel, of a series of sets of pendent stops pivoted above said keys and arranged to engage therewith to prevent the operation of two or more keys of a group simultaneously, but permitting the simultaneous operation of two or more keys of different groups, substantially as described.

cc 74. In a cash register and indicator, the combination, with a reg- key tering-wheel, a series of operating keys, a series of tablet-rods and the licating-tablets, one for each key, a vibrating dog-carrier and dog 84 actuating said registering-wheel, and a series of arms pivoted at cent ir lower ends directly to said keys and provided at their upper carri s with slots embracing said vibrating dog-carrier, whereby upon ing-l rating any one of said keys its indicating-tablet is exposed to serie v and its arm vibrates the dog-carrier to cause its dog to actuate registering-wheel to register the value of such key, substantially 299 described.

75. In a cash register and indicator, the combination of a register- oper g-wheel, a dog for actuating said wheel, a series of pivoted keys, a vie ries of tablet-rods and indicating-tablets actuated by said keys, a and ries of arms connected to said keys at points unequally distant Som the fulcrum of said keys, and connecting mechanism between cen id arms and actuating-dog, whereby upon operating any one of said keys its indicating-tablet is exposed to view and its 298 value is registered on said registering-wheel, substantially as described.

76. In a cash register and indicator, the combination of a registering-wheel, a series of pivoted operating-keys, a series of tablet-rods and indicating-tablets, one for each key, a vibrating dog-carrier and dog for actuating said registering-wheel, and a series of arms pivoted to said keys at points unequally distant from the fulcrum of said keys and connecting them to the vibrating dog-carrier, whereby upon operating any one of said keys its indicating-tablet is exposed to view and its arm vibrates the dog-carrier to cause its dog to actuate the registering-wheel to register the value of such key, substantially as described.

77. In a cash register and indicator, the combination of a registering-wheel, a series of pivoted operating-keys, a series of tablet-rods and indicating-tablets, one for each key, a vibrating dog-carrier and dog for actuating said registering-wheel, and a series of arms connected at their lower ends to said keys at points unequally distant from the fulcrum of said keys and provided at their upper ends

with slots embracing said vibrating dog-carrier, whereby upon operating any one of said keys its indicating-tablet is exposed to view and its arm vibrates the dog-carrier to cause its dog to actuate the registering-wheel to register the value of such key, substantially as described.

78. In a cash register and indicator, the combination of a registering-wheel, a series of operating-keys, a series of tablet-rods and indicating-tablets actuated thereby, a vibrating dog-carrier hung concentric with said registering-wheel and provided with a dog for actuating said wheel and a series of arms pivoted at their lower ends to said keys and engaging at their upper ends directly with said vibrating dog-carrier for communicating different degrees of motion thereto, whereby upon operating any one of said keys its indicating-tablet is exposed to view and its arm vibrates the dog-carrier to cause its dog to actuate the registering-wheel to register the value of such key, substantially as described.

79. In a cash register and indicator, the combination of a registering-wheel, a series of operating-keys, a series of tablet-rods and indicating-tablets actuated thereby, a vibrating dog-carrier hung concentric with said registering-wheel and provided with a dog for actuating said wheel, and a series of arms pivoted at their lower ends directly to said keys and provided at their upper ends with slots which embrace said vibrating dog-carrier, whereby upon operating any one of said keys its indicating-tablet is exposed to view and its arm vibrates the dog-carrier to cause its dog to actuate the registering-wheel to register the value of such key, substantially as described.

80. In a cash register and indicator, the combination of a registering-wheel, a series of pivoted operating-keys, a series of tablet-rods and indicating-tablets actuated thereby, a vibrating dog-carrier hung concentric with said registering-wheel and provided with a dog for actuating said wheel, and a series of arms connected at their lower ends to said keys at points unequally distant from the fulcrum of said keys and connected at their upper ends to said vibrating dog-carrier, whereby upon operating any one of said keys its indicating-tablet is exposed to view and its arm vibrates the dog-carrier to cause its dog to actuate the registering-wheel to register the value of such key, substantially as described.

81. In a cash register and indicator, the combination of a registering-wheel, a series of pivoted operating-keys, a series of tablet-rods and indicating-tablets actuated thereby, a vibrating dog-carrier hung concentric with said registering-wheel and provided with a dog for actuating said wheel, and a series of arms connected at their lower ends to said keys at points unequally distant from the fulcrum of said keys and provided at their upper ends with slots embracing said vibrating dog-carrier, whereby upon operating any one of said keys its indicating-tablet is exposed to view and its arm vibrates the dog-carrier to cause its dog to actuate the registering-wheel to register the value of such key, substantially as described.

82. In a cash register and indicator, the combination of a series of operating-keys indicating odd multiples of five above the first

power, a series of tablet-rods and indicating-tablets, one for each key, a ten-cent-registering wheel common to all the keys of said series and connecting mechanism between said keys and registering-wheel, a five-cent-registering wheel, and connecting mechanism between said wheel and all of the keys of said series, whereby upon operating any one of the keys of said series its indicating-tablet is exposed to view and the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

83. In a cash register and indicator, the combination of a series of operating-keys indicating odd multiples of five above the first power, a series of tablet-rods and indicating-tablets, one for each key, a ten-cent-registering wheel common to all the keys of said series and connecting mechanism between said keys and registering-wheel, a five-cent-registering wheel, and a five-cent bar actuated by each of the keys of said series and arranged to actuate the five-cent-registering wheel, whereby upon operating any one of said keys the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

84. In a cash register and indicator, the combination of a five-cent-registering wheel, a ten-cent-registering wheel, a vibrating dog-carrier and dog for actuating the ten-cent wheel, a series of operating-keys indicating odd multiples of five above the first power, a series of tablet-rods and indicating-tablets, one for each key, connecting mechanism between said keys and vibrating dog-
299 carrier, and a five-cent bar arranged to be operated by said keys to actuate the five-cent-registering wheel, whereby upon operating any one of said keys its indicating-tablet is exposed to view and the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

85. In a cash register and indicator, the combination of a five-cent-registering wheel, a ten-cent-registering wheel, a vibrating dog-carrier and dog for actuating the ten-cent wheel, a series of operating-keys indicating odd multiples of five above the first power, a series of tablet-rods and indicating-tablets, one for each key, a series of arms connecting said keys to the vibrating dog-carrier, and a five-cent bar arranged to be operated by said keys to actuate the five-cent-registering wheel, whereby upon operating any one of said keys its indicating-tablet is exposed to view, and the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

86. In a cash register and indicator, the combination of a five-cent-registering wheel, a ten-cent-registering wheel, a vibrating dog-carrier and dog for actuating the ten-cent wheel, a series of pivoted operating-keys indicating odd multiples of five above the first power, a series of tablet-rods and indicating-tablets, one for each key, a series of arms connected at their lower ends to said keys at points unequally distant from the fulcrum of said keys and engaging at their upper ends with the vibrating dog-carrier, and a five-cent bar arranged to be operated by said keys to actuate the five-cent-registering wheel, whereby upon operating any one of said keys

its indicating tablet is exposed to view and the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

87. In a cash register and indicator, the combination of a series of operating-keys indicating even multiples of five, another series of keys indicating odd multiples of five above the first power, a series of tablet-rods and indicating-tablets, one for each key, a ten-cent-registering wheel and connecting mechanism between said wheel and all the keys of both series, a five-cent-registering wheel, and connecting mechanism between said wheel and all the keys of the odd-numbered series, whereby upon operating an even-numbered key its indicating-tablet is exposed to view and its value is registered on the ten-cent wheel, and whereby upon operating an odd-numbered key its indicating-tablet is exposed to view and the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

88. In a cash register and indicator, the combination of a five-cent-registering wheel, a ten-cent-registering wheel, a dog for actuating the ten-cent wheel, a series of operating-keys indicating both even and odd multiples of five above the first power, a series of tablet-rods and indicating-tablets, one for each key, connecting mechanism between all of said keys and actuating dog, and a five-cent bar arranged to be operated by each of said odd-numbered keys to actuate the five-cent-registering wheel, whereby upon operating an even-numbered key its indicating-tablet is exposed to view and its value is registered on the ten-cent wheel, and whereby upon operating an odd-numbered key its indicating-tablet is exposed to view and the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

89. In a cash register and indicator, the combination of a five-cent-registering wheel, a ten-cent-registering wheel, a vibrating dog-carrier and dog for actuating the ten-cent wheel, a series of operating keys indicating both even and odd multiples of five above the first power, a series of tablet-rods and indicating-tablets, one for each key, a series of arms connecting said keys to the vibrating dog-carrier, and a five-cent bar arranged to be operated by the keys indicating odd multiples of five to actuate the five-cent registering wheel, whereby upon operating an even-numbered key its indicating-tablet is exposed to view and its value is registered on the ten-cent wheel, and whereby upon operating an odd-numbered key its indicating-tablet is exposed to view and the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

90. In a cash register and indicator, the combination of a five-cent-registering wheel, a ten-cent registering wheel, a vibrating dog-carrier and dog for actuating the ten-cent wheel, a series of pivoted operating-keys indicating both even and odd multiples of five above the first power, a series of tablet-rods and indicating-tablets, one for each key, a series of arms pivoted to said keys at points unequally distanced from the fulcrum of said keys and connecting said keys to the vibrating dog-carrier, and a five-cent bar arranged to be oper-

ated by the keys indicating odd multiples of five to actuate the five-cent registering wheel, whereby upon operating an even-numbered key its indicating tablet is exposed to view and its value is registered on the ten-cent wheel, and whereby upon operating an odd-numbered key its indicating-tablet is exposed to view and the tens of its value are registered on the ten-cent wheel and the five on the five-cent wheel, substantially as described.

91. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, a dollar-registering wheel, and vibrating dog-carriers and dogs for actuating the ten-cent and dollar registering wheels, of a series of operating-keys indicating cents in even and odd multiples of five above the first power, a series of keys indicating dollars in multiples of one, a series of tablet-rods and indicating-tablets actuated by said keys, connecting mechanism between the cent-keys and the vibrating dog-carrier of the ten-cent wheel, and connecting mechanism between the dollar-keys and the vibrating dog-carrier of the dollar-wheel, and a five-cent bar actuated by the cent-keys indicating odd multiples of five and arranged to actuate the five-cent-registering wheel, substantially as and for the purpose described.

92. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, a dollar-registering wheel, and vibrating dog-carriers and dogs for actuating the ten-cent and dollar wheels, of a series of operating-keys indicating cents in even and odd multiples of five above the first power, a series of keys indicating dollars in multiples of one, a series of tablet-rods and indicating-tablets actuated by said keys, a series of arms connecting the cent-keys to the vibrating dog-carrier of the ten-cent wheel, a series of arms connecting the dollar-keys to the vibrating dog-carrier of the dollar-wheel, a five-cent bar actuated by the cent-keys indicating odd multiples of five, and provided with a dog engaging with the five-cent-registering wheel, substantially as and for the purpose described.

93. In a cash register and indicator, the combination, with a five-cent-registering wheel, a ten-cent-registering wheel, a dollar-registering wheel, and vibrating dog-carriers and dogs for actuating the ten-cent and dollar wheels, of a series of pivoted operating-keys indicating cents in even and odd multiples of five above the first power, a series of keys indicating dollars in multiples of one, a series of tablet-rods and indicating-tablets actuated by said keys, a series of arms pivoted to said keys at points unequally distant from the fulcrum of said keys, the arms of the cent-keys being connected to the vibrating dog-carrier of the ten-cent wheel and the arms of the dollar-keys to the vibrating dog-carrier of the dollar-wheel, and a five-cent bar actuated by the cent-keys indicating odd multiples of five, and provided with a dog engaging with the five-cent-registering wheel, substantially as and for the purpose described.

94. In a cash register and indicator, the combination of a registering-wheel provided with a ratchet, a series of keys for actuating said wheel, a series of tablet-rods and indicating-tablets actuated by said keys, a brake-dog arranged to engage with the ratchet of said

wheel, but normally out of contact therewith, and mechanism connecting the brake-dog with the keys, whereby upon operating any one of the keys its indicating tablet is exposed to view and the brake-dog is positively actuated to engage with the teeth of the registering-wheel and form a positive stop therefor, substantially as described.

95. In a cash register and indicator, the combination of a registering-wheel provided with a ratchet, a series of keys for actuating said wheel, a series of tablet-rods and indicating-tablets actuated by said keys, a vibrating bar actuated by the operation of any one of said keys, a brake-dog arranged to engage with the ratchet of said wheel, and connecting mechanism between said brake-dog and vibrating bar, whereby upon the operation of any one of said keys its indicating-tablet is exposed to view and the brake-dog is actuated to engage with the ratchet of the registering-wheel and form a positive stop therefor, substantially as described.

96. In a cash register and indicator, the combination of a registering-wheel provided with a ratchet, a series of keys for actuating said wheel, a series of tablet-rods and indicating-tablets actuated by said keys, a vibrating bar actuated by the operation of any one of said keys, a rock-shaft, a brake-dog secured thereto and arranged to engage with the ratchet of said wheel, and connecting mechanism between said rock-shaft and vibrating bar, whereby upon operating any one of said keys its indicating-tablet is exposed to view and the rock-shaft is oscillated to cause its brake-dog to engage with the teeth of said wheel, substantially as described.

97. In a cash register and indicator, the combination of a registering-wheel provided with teeth, a vibrating dog-carrier and dog for actuating said wheel, a series of operating-keys, a series of tablet-rods and indicating-tablets, one for each key, a series of arms connecting said keys with the vibrating dog carrier, a brake-dog arranged to engage with the teeth of the registering-wheel, a vibrating bar actuated by the operation of any of said keys, and connecting mechanism between said vibrating bar and brake-dog, substantially as and for the purpose described.

98. In a cash register and indicator, the combination of a registering-wheel, a series of keys for operating said wheel, a series of tablet-rods and indicating-tablets actuated by said keys, and a series of stops arranged to permit the operation of any one key, but to at all times prevent the simultaneous operation of two or more keys, substantially as described.

99. In a cash register and indicator, the combination of a registering-wheel, a series of keys for operating said wheel, a series of tablet-rods and indicating-tablets actuated by said keys, and a series of pendent stops pivoted above said keys and arranged to engage therewith to prevent the operation of two or more of them simultaneously, substantially as described.

100. In a cash register and indicator, the combination of a registering-wheel, a vibrating dog-carrier and dog for actuating said wheel, a series of operating-keys, a series of tablet-rods and indicating-tablets actuated by said keys, connecting mechanism between

said keys and vibrating dog-carrier, and a series of stops arranged to prevent the operation of two or more keys simultaneously, substantially as described.

101. In a cash register and indicator, the combination of
301 a registering-wheel, a vibrating dog-carrier and dog for actuating said wheel, a series of operating-keys, a series of tablet-rods and indicating-tablet, one for each key, a series of arms connecting said keys with the vibrating dog-carrier, and a series of stops arranged to engage with said keys to prevent the operation of two or more of them simultaneously, substantially as described.

102. In a cash register and indicator, the combination of a registering-wheel, a vibrating dog-carrier and dog for actuating said wheel, a series of pivoted operating-keys, a series of tablet-rods and indicating-tablets, one for each key, a series of arms pivoted to said keys at points unequally distant from said keys and connecting said keys with the vibrating dog-carrier, and a series of pendent stops arranged to engage with the rear ends of said keys to prevent the operation of two or more of them simultaneously, substantially as described.

103. In a cash register and indicator, the combination of a series of registering-wheels, a series of groups of keys for operating said wheels, one group of keys for each wheel, a series of tablet-rods and indicating-tablets actuated by said keys, and a series of sets of stops arranged to prevent the operation of two or more keys of a group simultaneously, but permitting the simultaneous operation of two or more keys of different groups, substantially as described.

104. In a cash register and indicator, the combination of a series of registering-wheels, a series of vibrating dog-carriers and dogs for actuating said wheels, a series of groups of operating-keys, one group of keys for each wheel, a series of tablet-rods and indicating-tablets actuated by said keys, connecting mechanism between each group of keys and its corresponding dog-carrier, and a series of sets of stops arranged to prevent the operation of two or more keys of a group simultaneously, but permitting the simultaneous operation of two or more keys of different groups, substantially as described.

105. In a cash register and indicator, the combination of a series of registering-wheels, a series of vibrating dog-carriers and dogs for actuating said wheels, a series of groups of pivoted operating-keys, one group of keys for each wheel, a series of tablet-rods and indicating-tablets actuated by said keys, a series of arms connecting the keys of each group with its corresponding dog-carrier, and a series of sets of pendent stops arranged to engage with the rear ends of the keys of each group to prevent the operation of two or more keys of a group simultaneously, but permitting the simultaneous operation of two or more keys of different groups, substantially as described.

106. In a cash register and indicator, the combination of a registering-wheel, a vibrating dog-carrier and dog for actuating said wheel, a series of operating-keys, a series of tablet-rods and indicating-tablets, one for each key, a series of arms connecting said keys with the vibrating dog-carrier, a brake-dog arranged to engage with the teeth of the registering-wheel, a vibrating bar actuated by the

operation of any one of said keys, connecting mechanism between said vibrating bar and brake-dog, and a series of stops arranged to engage with said keys to prevent the operation of two or more of them simultaneously, substantially as described.

107. In a cash register and indicator, the combination of a five-cent-registering wheel, a ten-cent-registering wheel, a dollar-registering wheel, vibrating dog-carriers and dogs for actuating the ten-cent and dollar wheels, a series of operating-keys indicating cents in even and odd multiples of five above the first power, a series of keys indicating dollars in multiples of one, a series of tablet-rods and indicating-tablets, one for each key, a series of arms connecting the cent-keys with the vibrating dog-carrier of the ten cent wheel, and a series of arms connecting the dollar-keys with the vibrating dog-carrier of the dollar-wheel, a five-cent bar engaging with the cent-keys which indicate odd multiples of five and provided with a dog engaging with the five-cent wheel, a series of brake-dogs, one for each registering-wheel and arranged to engage with the teeth thereof, a vibrating bar actuated by the operation of the keys, connecting mechanism between said vibrating bar and brake-dogs, and two sets of stops, those of one set being arranged to engage with the dollar-keys and those of the other set with the cent-keys, substantially as and for the purpose described.

108. In a cash register and indicator, the combination of a series of registering-wheels provided with teeth, a series of vibrating dog-carriers and dogs for actuating said registering-wheels, a series of groups of operating-keys, one group for each registering-wheel, a series of tablet-rods and indicating-tablets, one for each key, a series of arms connecting the keys of each group with the vibrating dog-carrier of that group, a series of brake-dogs, one for each registering-wheel and arranged to engage with the teeth thereof, a series of vibrating bars, one for each group of keys, arranged to be actuated by the operation of any key of its group, connecting mechanism between each vibrating bar and the brake-dog of the corresponding registering-wheel, two sets of stops, those of one set arranged to engage with the dollar-keys and those of the other set with the cent-keys, a plate extending across the peripheries of all the registering-wheels and provided with a series of reading-openings, one for each wheel, and a series of supplemental registering-disks pivoted to the under side of said plate adjacent to the reading-openings, one for each registering-wheel and arranged to be turned one notch at each revolution of the registering-wheel, substantially as and for the purpose described.

109. The combination, with the gong-hammer *v*, provided with a laterally-projecting pin *u*, of the trip-bar *s*, normally engaging
302 with said pin and pivoted to the vibrating frame J, and the block *w*, engaging with the incline upon the trip-bar to disengage the same from the pin *u*, substantially as and for the purpose described.

110. The combination, with the vibrating frame J and drawer *p*, provided with a pin, *q*, of the pivoted locking-bar *n*, arranged to engage with the vibrating frame when the drawer is open, to prevent

the operation of the machine and to be thrown out of the way of the vibrating frame by the pin q when the drawer is closed, substantially as described.

JOHN F. HEADY.
JOHN H. PATTERSON.

Witnesses to John F. Heady's signature:
N. LINDENFELD.
S. B. LOCKWOOD.

Witnesses to John H. Patterson's signature:
HENRY THEOBALD.
THOS. CORWIN.

303 The following is the opinion of the circuit court in accordance with which the decree was entered March 23, 1891, dismissing the bill of complaint in this cause:

Circuit Court of the United States, District of Massachusetts. In Equity.

NATIONAL CASH REGISTER COMPANY
v.
BOSTON CASH INDICATOR AND RECORDER COMPANY *et al.* — No. 2405.

SAME
v.
BOSTON CASH INDICATOR AND RECORDER COMPANY. — No. 2542.

Opinion of the Court.

(March 23, 1891.)

COLT, *J.*:

These two cases were tried together. The first suit is brought for infringement of letters patent No. 271,363, dated January 30, 1883, granted to James Ritty and John Birch for certain new and useful improvements in cash-registers.

The specification states:

"Our invention relates to an improvement in cash registers and indicators designed for the use of storekeepers and others as a means of accurately registering the total cash receipts for any given period of time—as a day, for instance—and for indicating to the customers that the amount paid has been registered by disclosing to their view such amounts upon figured tablets.

304 The arrangements of the parts and operation of the machine are such that no tablet can be exhibited without its value being counted upon the registering mechanism, and whenever any tablet is disclosed it remains so until the machine is operated to disclose a second tablet.

The novelty of our invention consists in the construction, combinations, and arrangements of the various parts, as will be herewith set forth and specifically claimed.

* * * * * * *

In the lower portion of the frame, and extending horizontally across it, is a rod or shaft, D, supported by and aiding to connect the sides B of the frame. Upon this shaft are hung a series of parallel keys, E. * * * Each key has upon its front end, which extends through and projects from an opening in the front of the case or frame, a button, *e*, having marked upon it a figure to correspond with the value intended to be indicated and registered whenever that key is operated by depressing the button. * * *

Resting upon the flattened ends of the keys are vertical metal rods F—one for each key—which pass and have vertical play through perforations in metal guide-bars G, extending across and supported by the sides B. * * * The upper portion of each rod, just above the upper bar, G, is bent to form a knuckle or shoulder, *d*, upon its rear side, which has beveled or inclined operating faces, for a purpose to be presently explained.

Suitably secured to the top of each rod is a tablet, H, of thin flat metal, and upon the face of each tablet is a number corresponding with the number upon the key over whose rear end the rod of that tablet rests. * * *

Now, it is an important feature of our machine that after a key has been operated and its tablet exposed to view such tablet shall remain up and exposed until another key is operated, whereupon the first falls back out of view and the second remains exposed, and so on, thus always keeping in view the tablet of the key last operated. To effect this result we pivot, by means of trunnions or a shaft extending between the sides B, a forwardly inclined wing, I, pivoted at its lower edge, as at *f*, and resting at its upper edge against the rear sides of the upper portions of the rods F. This wing extends back of all of the rods, and is free to vibrate on its pivotal
305 axis *f*. It is yieldingly held against the rods by any suitable spring, a spiral spring being shown for that purpose in Fig. 2, secured at one end of the wing and to the side B of the frame. Just on the inner sides of the frames B, and pivoted upon the shaft D, are flat arms J, extending upward and rearward, and downward and forward of their pivotal points. The front ends of these arms extend into the opening made for the keys in the front of the case A, and are connected by a bar, K, extending entirely across this opening and resting up against the under sides of all the keys. Of course when any one of the keys is depressed the bar K is likewise carried down, and the upper portions of the arms J are vibrated forward, as seen in Fig. 2, where the dotted lines represent the normal position of the arms and one of the lower bank of keys, and the unbroken lines show the key depressed, carrying down the bar K and drawing forward the arms J. To return the bar J when the key is released, and to assist the key itself to return, any suitable spring may be employed. We have shown one, *g*, Fig. 2, connected at one end to one of the arms J and at its other end to the side of the frame B.

Pivoted at *h* upon the right-hand side of the frame B, Fig. 1, is a bell-crank tripping arm, L, with the rear end rounded and resting against the upper portion of the front side of the wing I. Its vibration is limited by two pins or detents, *i*, as shown, and upon the

same pivot, *h*, is hung a follower, *j*, whose lower end extends below the elbow of the bell crank, and whose rear edge rests against a shoulder, *k*, upon the bell crank. The lower end of this follower has a beveled engaging nose, *l*, against which the upper end of a trigger, *m*, pivoted at or near its middle, as at *o*, to the side B rests. The lower end of this trigger is connected to the upper end of the arm J, on that side of the machine by a link, *p*. The opposite arm, J, Figs. 2 and 3, is connected by a similar link, *q*, to similar tripping mechanism, *r s t*, for operating the hammer *u* of a bell or gong, M, which is secured in any suitable manner to the side B of the frame.

Now, the operation of thus much of the machine is as follows: When any key is pressed down its rod and tablet are raised, and the elbow *d* of the rod, in rising, aids in pressing back the wing I; but to aid the elbow the arm J on the right, which, as before explained, is drawn forward whenever a key is pressed, imparts motion
306 to the link *p* and trigger *m*, whose upper end, acting on the nose *l* of the follower *j*, presses it back, and with it the bell crank L, which is thus forced against the wing and presses it back. Now, the parts are so arranged that when the lower side of the elbow *d* is just above the top edge of the wing the key has completed its downward stroke, and is arrested by the front bar, N, of the case, the trigger *m* has passed beyond the nose *l* of the bell crank, so that the latter swings back out of the way, and the spring *a'* draws the wing forward under the elbow *d*, so that the latter rests upon the upper edge, as seen at *b'*, Figs. 1 and 2, and there remains, thus retaining the tablet and rod of the operated key elevated. Now, upon releasing the key it falls backward to its normal position by gravity, and is aided by the spring *g*, Fig. 2, which returns the bar *k* and arms J.

The follower *j*, being free to swing forward without moving the bell crank, permits the trigger *m* to flip it up and pass under its nose to its normal position. During this operation the opposite arm J, Fig. 2, has in like manner actuated the hammer of the gong, which is sounded every time a key is depressed to farthest limit, and only then, and thus gives notice to the customer that the machine has been properly operated. Whenever the same key is successively operated its rod and the tablet remain up and exposed to view; but when a different key is operated the tablet of the previous one is released and falls back out of sight, and the tablet of the operated key remains up and exposed."

The first claim is in controversy in this suit which is as follows:

"In a registering and indicating machine, the combination, with a series of indicating tablets operated by a series of keys, of a series of rods, each provided with a detent or shoulder and carrying one of the aforesaid tablets, and a supporting wing with connecting mechanism, whereby upon operating any one of the keys the wing is so moved as to permit the passage of the rod, and whereby upon the release of the key the wing engages with and holds up the tablet rod and tablet, substantially as described."

The object of a cash-register is twofold, first, to register at the

close of the day the total amount of sales, and, second, to
307 indicate the amount of each sale upon the tablet which is raised into the view of the customer, by the pressure upon the key.

At the date of the Ritty and Birch invention it is admitted that cash-registers were old.

A series of keys, rods and indicating tablets are to be found in the prior English Pottin patent of May 28, 1877, and in the Campbell patent of February 14, 1882. In these machines we find an indicating mechanism which in its general features is the same as that of the patent in suit. The most therefore that Ritty and Birch can claim, in view of the prior state of the art, is an improvement upon the Pottin and Campbell registers, and that improvement consisted in devices whereby it was made certain that the preceding tablet would fall when another tablet came into view.

In previous devices it was found that if the shoulders upon the rods became worn, or the machine became clogged with dust, you could not always rely upon the falling of the preceding tablet when the key was pressed and another tablet raised, and that consequently two tablets might be in sight of the customer at the same time. The object of the Ritty and Birch patent was to remedy this defect. This was done by means of the wing and connecting mechanism, whereby the support which holds the tablet rods up is pressed so far away from the shoulders of the rods that they are sure to fall by the force of gravity.

It is contended that all Ritty and Birch are entitled to under their patent is the specific mechanism, or its equivalent, by which this improvement was accomplished, and the only question in this case is whether the court should give such a broad construction to the first claim of the patent as to cover the defendants' device. I am of opinion that, in view of the prior state of the art, the Ritty and Birch patent must be confined to the specific mechanism,
308 or its equivalent, which go to make up the combination covered by the first claim of the patent. The only novel feature in that claim is the supporting wing with connecting mechanism, and the question therefore narrows itself down to this,—Do the defendants in their machine use these devices, or well-known equivalents thereof? I do not find in the defendants' register the wing and connecting mechanism of the Ritty and Birch patent.

The defendants' machine is of the Pottin and Campbell type. It has what is common to all these machines, a series of keys pivoted upon a bar and a series of tablets with numbers thereon. It has also a registering mechanism, but here it seems to me the resemblance between the two machines ceases. It has no pivoted supporting wing such as is shown in the patent in suit, but instead thereof it has a sliding bar with projections, which reaches across in front of the rows of tablets, and is arranged upon a guide-frame in which the rods slide up and down. The tablet rods are not bent as in the complainants' machine, nor do we find the same connecting devices, such as the flat arms J, link, trigger and bent lever L, with follower.

In the construction of the connecting mechanism, so called, the defendants use a plate hung by lugs on the same shaft upon which the keys are pivoted, extending above the whole bank of keys. Upon the left end of the plate is a pin which engages a bell-crank lever pivoted upon an arm set in the bottom of the machine. One end of this lever is operated by the pin, and the other end has a cam upon it which engages with another cam upon an arm projecting downward from the sliding bar. The bell-crank lever is pulled to the left at its lower end by a spring. When any key is depressed, by means of the pin, which lifts the lower end of the lever, the cam end of the lever slides down the cam connected with the sliding bar and throws the bar to the left, thereby releasing any tablet
309 which may have been raised. At the time when the key is completely depressed the cam upon the lower end of the lever comes below the cam on the lower end of the sliding bar, and the bar is immediately pulled back into its normal position by a spring, so that any tablet which is being raised will be held by the projection upon the sliding bar.

Considering the scope of the Ritty and Birch patent, taken in connection with what existed prior to that invention, I cannot hold the defendants' plate and connecting devices to be the equivalents of the wing with connecting mechanism described in the Ritty and Birch patent. I must therefore decide that there is no infringement, and direct that the bill be dismissed.

The second suit charges infringement of letters patent No. 253,506, granted February 14, 1882, to Michael Campbell, for an improvement in cash-registering apparatus. Campbell's improvement consisted in combining with a cash-register a spring drawer. The specification says:

"This invention relates to a cash-registering apparatus to be employed in connection with a cash drawer.

* * * * * * *

The case A, which receives the working parts of the apparatus to be described, has a locked door, B, and a drawer, C, acted upon by a drawer-opener, (shown in Fig. 2,) as a rod, a, surrounded by a spiral spring, a', the spring being compressed when the drawer is closed, as in said figure, where it is held closed by the drawer-holder, (shown as a lever, D,) the inner end of which acts upon the interior of the inner end of the drawer, the outer end of the said lever being held up by a spring, a^2, against a toggle lever, b, (shown in dotted lines, Fig. 4,) one limb of which is connected with the pawl-carrier c, common to all the levers of the series of levers d e f, while its other limb is joined with a fixed bar, c', of the apparatus at c^2, this latter bar serving as a support and guide for the pawl-carrier. The toggle lever b is bent or thrown down where its two limbs are joined together whenever the pawl-carrier c is moved in the direction of
310 the arrow on it, Fig. 4, thus depressing the outer end of the drawer-holder D, lifting its inner end from the drawer and permitting the spring a' to throw the drawer open, as in Fig. 1, ready to receive a deposit of cash, and at the same time a pawl, c^3, carried by the pawl-carrier c, engages one of the bars of the lantern wheel c^4, caus-

ing another bar of the said lantern wheel to move the lever c^5, pivoted at c^6, and held against the lantern wheel by the spring c^7, the said lever c^5 being connected at its rear end with an arm, c^8, pivoted at 2, which arm c^8 is in turn loosely connected with the end of the striker lever c^9 pivoted at 3, the striker c^{10} on the said lever striking the gong c^{12} each time the drawer is opened."

The only claim in controversy is the third:

"In a cash-registering apparatus, a series of keys to designate certain amounts, combined with the drawer, the drawer-holder D, mediately connected with said keys, and the spring to throw the drawer open when released by the drawer-holder, substantially as described."

The same question presents itself in this suit as in the first, namely,—How broad a construction should the court give to the Campbell patent? The registering apparatus was old, the opening of a drawer by means of a spring was old, but the connecting mechanism between a cash-register and a spring drawer was new with Campbell. If the defendants' machine contains this connecting mechanism, or what may fairly be considered its equivalent, the complainants are entitled to a decree, but if the connecting mechanism, which is made an element of the claim sued upon is radically different in the defendants' machine, I cannot say that a case of infringement has been made out.

A comparison between the two machines in connection with the record in the case, shows that the defendants use a very different connecting mechanism, and one which does not embody the patented device, unless the patent be held to cover all forms of connecting devices known at the time, and I can find no war-
311 rant for giving the patent such a liberal construction. Henry B. Renwick, called as an expert on behalf of the complainants, says:

"Now, it is evident that there are no toggles or equivalents of toggles in this defendant's apparatus."

I am aware that he goes on to state that these toggle levers make a part of claim 2 of the patent, and that therefore claim 3 should not be limited to the specific connecting devices described in the patent, or to their equivalents. He further says:

"It therefore seems to me, in view of the language and scope of the third claim of the plaintiffs' patent, that if the court shall hold that a claim covers not only the equivalents but also the known substitutes for an apparatus which is one element of the claim, then the defendants' contrivance embodies the invention set forth in the third claim of plaintiffs' patent.

Now by well-settled rules the court is to look at what the patentee invented, and the means by which he accomplishes the result, and another person does not infringe unless he makes use of the same or equivalent means for accomplishing the same result. I know in a certain class of cases the Supreme Court have given a very liberal construction as to what constitutes an equivalent, but I do not think that either of the patents involved in these suits come within that class of cases which deal with pioneer inventions.

The defendants' machine does not employ the connecting devices which were novel with Campbell. Over the bank of keys a flat plate is pivoted by lugs upon the same shaft as the key; when any key is actuated the hooked end of this plate lifts a bolt, which is engaged with a projection upon the drawer beneath, and when the bolt is lifted the drawer is thrown open by a spring behind
312 it; when the door is shut the bolt rises over the incline and falls on its forward side, thereby holding the drawer closed. This simple contrivance does away with the somewhat complicated system of toggle levers in combination with a sliding bar, which is the connecting mechanism invented by Campbell and found described in his patent. Holding that the defendants' machine is not within the Campbell patent, I must direct that the bill be dismissed.

Bills dismissed

313 *Clerk's Certificate.*

UNITED STATES OF AMERICA, } ss:
Massachusetts District, }

I, John G. Stetson, clerk of the circuit court of the United States for the first circuit and district of Massachusetts, certify that the foregoing is a true copy of the record of said circuit court in the cause in equity entitled National Cash Register Company, complainant, *v.* Boston Cash Indicator and Recorder Company *et al.*, defendants, lately determined in said circuit court, and of all proceedings therein and of the opinion of the court therein.

Seal of the Circuit Court, Massachusetts.

In testimony whereof I hereunto set my hand and affix the seal of said circuit court, at Boston, in said district this first day of May, in the year of our Lord one thousand eight hundred and ninety-one, and of the Independence of the United States the one hundred and fifteenth.

JOHN G. STETSON, *Clerk.*

Endorsed on cover: Case No. 14,626. Massachusetts C. C. U. S. No. 155. The National Cash Register Company, appellant, *vs.* The Boston Cash Indicator and Recorder Company and James H. Wright, president. Filed May 7, 1891.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1894.

THE NATIONAL CASH REGISTER COMPANY, Appellant,
vs.
THE BOSTON CASH INDICATOR AND RECORDER COMPANY and JAMES H. WRIGHT, President.
No. 155.

Stipulation.

Whereas it appears that the clerk of the circuit court has failed to include in the transcript of the record in this appeal the documentary evidence offered by the complainant corporation in proof of its due organization and change of name as a corporation under the laws of the State of Ohio, as set forth in its bill of complaint herein, and in proof of its legal title to the letters patent in suit, as set out in said bill; and

Whereas the said clerk has also failed to include in the transcript the stipulation between counsel for the respective parties to the effect that the sample machine put in evidence by complainant as Complainant's Exhibit Defendants' Machine correctly represented the alleged infringing machines made and sold by defendants, as set forth in said bill; and

Whereas no question was raised in the circuit court as to the due and lawful organization, change of name, and continuing existence of the complainant corporation, and its legal title to the letters patent in suit, or as to the correct representation of defendants' machines by the aforesaid exhibit, and appellees intend to raise none here:

Now, therefore, it is hereby stipulated and agreed by and between counsel for the respective parties that, for the purposes of this appeal, the due and lawful organization of the complainant corporation and its subsequent change of name and continuing existence and its full legal title to the letters patent in suit, as set forth in the bill of complaint, may be considered as proved or as admitted by appellees, and that the aforesaid exhibit put in evidence by complainant correctly represents machines made and sold by defendants at and prior to the filing of the bill of complaint, as alleged therein.

EDWARD RECTOR,
Counsel for Appellant.
FREDERICK P. FISH,
Counsel for Appellees.

[Endorsed:] Case No. 14,626. Supreme Court U. S., October term, 1894. Term No., 155. The National Cash Register Co., app't, *vs.* The Boston Cash Indicator and Recorder Co. *et al.* Stipulation in regard to record. Filed Dec. 10, 1894.

155-502

Office Supreme Court, U. S.
FILED
JAN 2 1895
JAMES H. McKENNEY,
Clerk

155-502

Supreme Court of the United States.

OCTOBER TERM, A. D. 1894.

No. 155.

THE NATIONAL CASH REGISTER COMPANY,
Appellant,

vs.

THE BOSTON CASH INDICATOR AND RECORDER COMPANY and JAMES H. WRIGHT, President,
Appellees.

Appeal from the Circuit Court of the United States for the District of Massachusetts.

BRIEF FOR APPELLANT.

Edward Rector,
Lysander Hill,
Of Counsel.

Eastman Bros., Law Printers, 187 Washington St., Chicago.

INDEX.

Statement of the Case 1

Litigation in the Third Circuit upon the Ritty & Birch patent, in which the claim in suit was sustained by Judges Acheson and Butler, and held infringed by the machine before them 1

Litigation in the same Circuit upon the Campbell patent (discussed in Judge Colt's opinion, and construed in the same way as the Ritty & Birch patent). Decision of the Circuit Court of Appeals disapproving Judge Colt's construction of the patent 2–3

Assignment of Error 3

Statement of Contents of Record 3

ARGUMENT.

Cash Registers Generally—What they are, and what they are used for 4

The Indicating Mechanism—Its purpose and effect, and its three essential features 5–9

The Patented Invention—The Ritty & Birch Machine. The invention considered upon the plan suggested in *Winans* v. *Denmead*—the structure in which it is embodied, its mode of operation, the result accomplished by it, and the claim of the patent 9–10

The structure embodying the patented invention consists of a series of keys, a series of shouldered rods, a series of indicators carried by the rods, a spring-pressed supporting bar adapted to catch under the shoulders of the lifted rods to hold their indicators in exposed

position, and a mechanism between the keys and supporting bar for disengaging the latter from the shoulders of the lifted rods to release them 10

All of this structure, excepting the train of mechanism between the keys and supporting bar, was old at the date of the Ritty & Birch invention 12

Defects and impracticability of the old structure, and reasons therefor 12–13

The defects overcome by the addition of the connecting mechanism to the old structure. The effect of the introduction of this mechanism into the old combination; the new combination and the new mode of operation which it produced .. 13–15

The essential characteristics of this mechanism, and its mode of operation in the combination .. 15

The two results accomplished by the new combination 15–16

The claim in suit—drawn to the combination of the keys, shouldered rods, indicators, supporting bar and connecting mechanism 16–17

Nothing novel or peculiar in any one of the elements individually 17

The functions of the several elements in the combination, and their contribution to its mode of operation, pointed out and shown to be important, while the *form* of the several elements is not 17–18

The principle and mode of operation of the invention stated 18–19

The Prior Art.—Its Bearing upon the Patented Invention.

The record shows (1) that the five elements included in the combination covered by the claim in suit were never, in any shape or form, combined before, and (2) that the mode of operation of the combination—the principle of the invention—had never existed before..... 19

Judges Acheson and Butler found in the Philadelphia case that the combination "*was absolutely new*, and that it gives to the machine increased efficiency, and, indeed, a new capability, completely remedying serious defects".. 20–21

The Prior Art Rests Entirely Upon Paper—No Practical Machines Ever Made or Used. 22

The Russell Patent.—It exhibits the same combination as the Ritty & Birch machine, without the latter's connecting mechanism between the keys and supporting bar 23

The Pottin Patent.—It has no connecting mechanism between the keys and supporting bar, and exhibits, with a *sliding* form of supporting bar, the same combination of elements as the Ritty & Birch machine without its connecting mechanism 24–27

The Campbell Patent.—It has no connecting mechanism between the keys and tablet-supporting device, and, so far as it goes, exhibits the same combination of elements as the Russell and Pottin patents..... 28–31

Other patents put in evidence by defendants—None of them exhibits a combination of ele-

ments or a mode of operation in any way resembling the Ritty & Birch combination. Their only effect is to exhibit *known substitutes* of some its individual elements..... 32

Defendants' Machine.

Defendants' machine described without its connecting mechanism..... 32–34

Without such connecting mechanism it is substantially the same as the Russell machine, or the Pottin machine without its latches, or the Ritty & Birch machine without its connecting mechanism..... 34

The connecting mechanism in defendants' machine..... 34–36

Operation of defendants' machine without its connecting mechanism illustrated and shown to be the same as that of the Ritty & Birch machine without its connecting mechanism..... 36–38

The two connecting mechanisms, their modes of operation, and the results accomplished by them in the combination, specifically compared and shown to be the same..... 38–40

Formal differences between the two machines—but the Ritty & Birch invention has nothing to do with *form*..... 40

Demonstration of the fact that defendants' connecting mechanism is but a different form of the Ritty & Birch mechanism..... 41–43

Construction of the Claim—Judge Colt's Error.

In *Winans* v. *Denmead* this court said it was the *mode of operation* of a patented device which gave it "the character of an invention," and

that its mode of operation "*is the thing entitled to protection.*" Judge Colt wholly ignored the mode of operation of the Ritty & Birch combination, and devoted his entire attention to the specific construction of its individual elements.. 44

The language of his opinion quoted, and the confusing and misleading character of some of the statements illustrated..... 44–48

Reasons for Not Restricting the Claim to a Pivoted Supporting Bar.

1. The prior art not only does not require such restriction of the claim, but such restriction of it is inconsistent with the prior art, because a *pivoted* supporting bar is found in combination with shouldered indicator supports in the Russell patent, and the novelty of the claim, therefore, *could* not depend upon pivoting the bar 48

2. Pivoted and sliding bars, plates or other members are well recognized equivalents and substitutes for each other in mechanics where one will do the work of the other..... 49

3. The record shows that they were *known substitutes* for each other *in the art of indicating mechanisms*, for the pivoted form of bar is found in the Russell patent, and the sliding form in the Pottin patent..... 49

4. There is nothing in the specification of the patent, nor in the claim in suit, requiring such restriction of the claim. The specification and the claim refer to the pivoted bar as the "wing," which is a common mechanical term for such a pivoted bar or plate, but there is no emphasis

laid upon this form of bar and no preference expressed for it, and this court has held that in comparing mechanical devices we are not to judge of similarities or differences *by the names of things*, but by the function they perform and the way they perform it. (*Machine Co.* v. *Murphy*) 49–50

Moreover, as appears from Judge Acheson's opinion in the Philadelphia case, the defendants' machine there employed a supporting bar which slid in guides at its ends, instead of swinging on a pivot; yet he and Judge Butler held that "*for the intended purpose the two devices are essentially the same thing*" 50–51

5. A restriction of the claim to a pivoted bar will not protect the actual invention which the patentees made, and this court has held that while a patentee *may* so restrict his claim as to cover less than his actual invention, "*yet such an interpretation should not be put upon his claim if it can fairly be construed otherwise.*" (*Winans* v. *Denmead.*) 51–52

Reasons for Not Limiting the Claim to the Specific Form of the Connecting Mechanism.

1. There is nothing in the prior art requiring such restriction of the claim, for the Ritty & Birch combination was broadly new with *any form* of connecting mechanism *which would do the work in the combination* 52

2. There is nothing in the specification of the patent which limits the invention to the specific form of mechanism shown in the drawings of

the patent, or which even expresses a preference for such form of mechanism; while in the claim the element is expressed in the broadest possible language. The fact that the specification describes only one form of mechanism is immaterial under the express holding of this court in *Winans* v. *Denmead*..... 53

3. Defendants' connecting mechanism, or any other connecting mechanism which will perform the same duty in the same way, is the obvious mechanical equivalent of the Ritty & Birch form of mechanism *in the combination* in question..... 53

The holdings of this court in *Cochrane* v. *Deener*, and *Blake* v. *Robertson* applied..... 54–55

4. Such restriction of the claim excludes from its scope *known substitutes* of its individual elements, contrary to the first rules of construction of combination claims: *Carter* v. *Baker*.. 55–56

5. Such restriction of the claim fails to afford any protection whatever to the actual invention made by the patentees, for any infringer may use the actual invention and escape the patent by slightly varying the form of the connecting mechanism, or by adopting in its place a known substitute for it..... 56

Moreover, the record shows that complainant has itself used various different forms of the connecting mechanism in the 15,000 Ritty & Birch machines made by it prior to the close of the testimony in the case..... 56

6. The claim should not be restricted to the specific form of the connecting mechanism, because such restriction changes the form and character of the claim, by making each piece or part of the connecting mechanism a substantive element of the claim, and creates a claim for a combination of ten or more separate elements, instead of a combination of five elements of which the connecting mechanism *as a whole* is one 56–57

7. The claim should not be so restricted, because the patent contains another claim, the fourth, for the specific form of connecting mechanism in combination with the wing. *Authorities* 58

8. The claim should not be restricted to the specific form of the mechanism, because *that* is the construction which would have to be given the claim if the combination had been old with some *other* form of mechanism, whereas in the present instance the combination was broadly new with *any* form of such mechanism 58–59

Judge Colt Was Misled by Differences in Form and Appearance.

His formal comparison of complainant's and defendants' machines—the differences in form which he saw, and the identities in substance which he did not see 59–63

The Claim as it Actually Appears in the Patent, and the Claim as Judge Colt Read It .. 64

The Construction Given the Claim was an Illiberal One, in no way Commensurate with the Character of the Invention and the Actual Advance in the Art Made by the Patentees.

Judges Acheson and Butler found in the Philadelphia case that the combination of the claim in suit "was absolutely new, and that it gives to the machine increased efficiency, and, indeed, a new capability, completely remedying serious defects;" that it accomplished an old result in a superior manner, "and by means *altogether different*, both as respects construction and *mode of operation*, from the old devices"; that it also accomplished "an important *new* result; certainly one which had never been accomplished *in any practical way*;" and that "the invention of Ritty & Birch *was one of more than ordinary merit*." 66

Judge Colt's opinion that patents for improvements upon existing machines must be narrowly construed—that, cash registers being old, and the Ritty & Birch invention consisting in an *improvement* upon them, it must, therefore, be restricted to details of construction—shown to be unsound in principle, and unwarranted under the decisions of this court. *Authorities* 65–73

Further Limitations Contended for by Defendants.—The Specification of the Ritty & Birch Patent.

Defendants' contention for a restriction of

the claim to the "aiding" operation of the shoulders on the rods—to an adjustment of the parts which will permit the shoulders of the rising rods to *touch* the supporting bar..... 73

Such adjustment of the parts shown to be utterly immaterial in the practical operation of the machine..... 74–75

The *gist* of defendants' contention on this point—its absurdity and unreasonableness pointed out..... 76

Complainant has never manufactured its Ritty & Birch machines with such adjustment..... 76

Difficulty in attaining such adjustment in the practical manufacture of machines proved by defendants' own expert..... 76–78

It being clear that the operation and adjustment in question has nothing to do with the actual invention, the court will not restrict the claim to it unless obliged to do so by the language of the specification and claim. *Authorities*..... 78–79

There is nothing whatever in the specification and claim requiring any such restriction of the claim. The patent, considered as a whole, and analyzed, and shown to set forth the actual invention..... 79–84

The specification does not lay any emphasis upon such "aiding" operation, does not give or suggest *any reason for it*, does not say that it is necessary, or even advantageous or desirable, *and the claim does not mention it*..... 84

No more reason for restricting the claim to this particular part of the description than to

any other of a dozen different parts of it. Illustrations. 84–86

Authorities: *Hoyt* v. *Horne*; *Winans* v. *Denmead*; *Machine Co.* v. *Murphy*; Judge Acheson's opinion in the Philadelphia case. 87–89

Snow v. *Railway Co.*, relied on by defendants, shown not to be a controlling or even a pertinent authority upon the present case. 91–93

The review of the authorities, including *Snow* v. *Railway Co.*, in the recent case of *Reece Button-Hole Machine Co.* v. *Globe Button-Hole Machine Co.*, 61 Fed. Rep. 958 (C. C. A., First Circuit) 93

Defendants' authorities in support of a narrow construction of the claim, all answered by the language of Mr. Justice Brown in *Roller Mill Co.* v. *Combs*, 39 Fed. Rep., 25, 30. 93–94

Defendants' Expert Testimony—Its Character Illustrated 94–96

The Litigation on the Campbell Patent.

The Ritty & Birch and the Campbell inventions compared. 96–98

Judge Colt's similar treatment of them in his opinion in the present case—the language of his opinion. 98

The decision of the Circuit Court of Appeals for the Third Circuit, disapproving Judge Colt's construction of the Campbell patent, and its pertinency as an authority in this case. 99–101

Conclusion.

The place the Ritty & Birch invention occupies in the art of cash registers. 101

The industry which has been built up on the invention 102

A fair and reasonable construction of the claim, with a disposition to protect the actual invention, is all that appellant asks. The bill does not pray for an account of profits and damages 102

Appendix.—The Philadelphia decisions ..... i–xx

Supreme Court of the United States.

OCTOBER TERM, A. D. 1894.

No. 155.

THE NATIONAL CASH REGISTER COMPANY,
Appellant,

vs.

THE BOSTON CASH INDICATOR AND RECORDER COMPANY and JAMES H. WRIGHT, President,
Appellees.

Statement of the Case.

This is an appeal by complainant from a decree of the Circuit Court for the First Circuit dismissing the bill of complaint. The suit was brought for an alleged infringement of letters patent of the United States No. 271,363, granted Ritty & Birch, January 30, 1883, for an improvement in cash registers and indicators. The first claim of the patent is the only one involved. Judge Colt, holding the Circuit Court, dismissed complainant's bill upon the ground that this claim was not infringed by defendants' machine. The opinion of the court (45 Fed. Rep., p. 481) is found at page 215 of the record.

The patent has also been the subject of litigation in the Third Circuit, where Judges Acheson and Butler, with Judge Colt's opinion and the record in the Boston case

before them, sustained the patent and held the machine of the defendant in that case to infringe its first claim. (*National Cash Register Company* v. *American Cash Register Company*, 47 Fed. Rep., 212). Judge Acheson's opinion in this case will be found printed in the Appendix to our brief (pp. i-x), and the suit will be hereafter referred to as the Philadelphia case, while the suit in the First Circuit, in which this appeal is taken, will be called the Boston case.

It will also be seen upon reference to Judge Colt's opinion in the present case (Record, 215) that the Boston litigation included a second suit, involving the third claim of the Campbell patent, No. 253,506, which Judge Colt found not infringed by defendants' same machine for substantially the same reasons he found non-infringement of the first claim of the Ritty & Birch patent, his one opinion covering both suits and both patents.

The Philadelphia litigation likewise involved both of these patents and was based upon the same claims thereof. In the Ritty & Birch case, as above stated, Judges Acheson and Butler held the defendant's machine to infringe the first claim of the patent. They had a sample of the Boston machine before them, and, as stated in their opinion, found sufficient difference between it and the Philadelphia machine to enable them to hold the latter machine to be an infringement of the patent, without violating the rule of comity in relation to Judge Colt's opinion. In the case of the Campbell patent, however, the Philadelphia machine was a wider departure from that of the patent than was the Boston machine, so that the court could not hold it to infringe the patent without dissenting from Judge Colt's opinion; and hence, without going into the merits of the case, and expressly stating that it simply followed the Boston decision under the rule

of comity, it ordered a decree dismissing complainant's bill. From that decree an appeal was taken to the Circuit Court of Appeals for the Third Circuit, which, in an opinion by Judge Dallas, reversed the decree of the Circuit Court, expressly disapproved the decision in the Boston case, sustained and broadly construed the claim in suit, and ordered a decree for complainant. (*National Cash Register Company* v. *American Cash Register Company*, 53 Fed. Rep., 367.) Judge Dallas' opinion in this case has also been printed in the Appendix to our brief (pp. xi–xx) and will be hereafter referred to.

Assignment of Error.

The Circuit Court erred

1. In its construction of the first claim of the Ritty & Birch patent in suit.

2. In holding that defendants' machine did not infringe said claim.

3. In dismissing complainant's bill.

Contents of the Record.

The testimony on behalf of appellant consists of the depositions of two experts, Mr. See and Mr. Henry B. Renwick, and the deposition of Mr. Patterson, vice-president of the appellant company and superintendent of its manufacturing department; that on behalf of appellees consists of the depositions of three experts, Mr. Hill, Mr. Webster and Mr. Shepard.

The record also includes various documentary exhibits, copies of patents, models, and a sample of defendants' machine.

ARGUMENT.

Cash Registers Generally.

Cash registers and indicators (known to the trade and public, and hereafter referred to, by the shorter term of cash registers) are in extensive use in many classes of retail stores, for the purpose of preserving a record or registration of all sales made in the establishment. Their primary object is to afford a convenient means for making such record or registration and to insure the accuracy of it, so that the proprietor may know at the end of a day's business the exact amount of the day's sales, and may be assured that each sale made has been accurately and honestly registered upon the machine. To this end a cash register consists of a series of operating keys representing different amounts, as five cents, ten cents, and so on, up to one dollar or more; a registering mechanism upon which the values of the operated keys are added and preserved; an indicating mechanism, by which when any key is operated an indicator representing the value of such key is exposed to view; an alarm which is sounded by the operation of each key, to call attention to the machine and to the exposed indicator; and, usually, a money drawer which is automatically unlocked and thrown open at the operation of any one of the keys.

The operating keys and registering mechanism constitute simply an adding machine, and without the indicating mechanism they would serve no other purpose. When a clerk made a sale he might go to the machine and add the amount of the sale upon it by operating the proper key, just as he might write the amount in a book kept for the purpose; but if he were dishonestly disposed he could just as easily operate the wrong key and register a

less amount than the sale, and pocket the difference, and the proprietor never be the wiser; just as he could write down the wrong amount in a book with the same result. The indicating mechanism is the element which distinguishes a cash register from a mere adding machine. It gives vitality to the machine and makes it useful for the purpose of a cash register. It insures the making of an accurate record or registration for the proprietor, by *compelling* the clerk to operate the *proper* key when he registers each sale. It is the *detective* element of the machine. When the clerk operates a given key the indicator representing the value of that key, and no other, is exposed to view, and as the attention of the customers and bystanders is called to the exposed indicator by the sounding of the alarm, the clerk *cannot operate the wrong key* without imminent risk of detection. Fear of such detection induces him to operate the right key, and when he does so the correct amount of the sale is necessarily added upon the registering mechanism, and he therefore has to account for the money to the proprietor.

ESSENTIAL FEATURES OF A PRACTICAL INDICATING MECHANISM.

To enable the indicating mechanism to serve this important purpose it must have a certain mode of operation, or at least certain essential features of operation. In the first place, when an indicator is exposed to view by the operation of a key it must remain exposed long enough to be clearly seen by the customer and bystanders, whose attention has been attracted by the sounding of the alarm. If it were simply lifted into view by the key, and dropped back out of view as soon as the key was released, it would be exposed but an instant and would serve no useful purpose. The first essential element of the indicating

mechanism, besides the keys and indicators themselves, therefore consists in means for temporarily holding the indicator in view after its operating key has been released and returned to normal position. To this end some suitable holding means operating to automatically engage the lifted indicator and hold it in view must be employed.

In the second place, the exposed indicator must be released and dropped out of sight either before or at the time of operating the machine to register the next sale, for when any given sale is registered the indicator representing the amount of such sale, and none other, must remain exposed to view. The holding means may be moved by hand to release the exposed indicator before registering each new sale, but this would require at each operation of the machine, first, an independent movement of some device to disengage the holding means from the exposed indicator, and, second, the regular operation of one of the keys to register the sale and expose another indicator. To avoid the necessity for this double operation in both complainant's and defendants' machines the holding means is automatically disengaged from the exposed indicator when any one of the keys is operated to expose another indicator. The indicator lifted into view at any operation of the machine therefore remains exposed until the machine is operated to register the next sale, whereupon the exposed indicator drops out of view and the one representing the new sale is moved into view.

From the foregoing it will be understood that it is necessary that the operation of automatically dropping one indicator out of view when another is lifted into view shall be accomplished with absolute certainty, for if the indicator representing one sale should remain exposed after that representing the next sale had been lifted into view there would be two indicators, representing two different

sales, exposed to view at the same time, so that the machine would present a confused indication, not properly representing either sale, and give opportunity for fraudulent manipulation of the machine. The second essential requisite of a machine of this class, therefore, consists in means for automatically disengaging the holding means from the exposed indicator when the next indicator is lifted into view, and for doing so with *absolute certainty*. Stress is here laid upon the necessity for certainty and reliability in this operation, for the reason that prior to complainant's invention it had been *proposed* in various old patents to automatically release the exposed indicator by the act of exposing another one, but in only one instance, as clearly shown by the record, was the proposed construction such that any certainty of operation was *possible*, and in the excepted instance the result was accomplished by means radically different from that employed by complainant and wholly outside the claim of the patent here in controversy.

In the third place, machines of this character are generally provided with a series of keys representing various amounts in *cents*, usually in multiples of five, from five cents to ninety-five, and also with one or more keys representing amounts in *dollars*. Both complainant's and defendants' machines are so provided. The Ritty & Birch patent shows twenty keys, nineteen of which represent cents, in multiples of five from five to ninety-five, inclusive, while the twentieth key represents one dollar. The purpose of this provision is to enable sales exceeding one dollar to be registered upon the machine and properly indicated. Thus, to register a sale of one dollar and ten cents, the clerk will depress the dollar key and the ten-cent key at the same time, causing both amounts to be added upon the registering mechanism, and

the dollar indicator and the ten-cent indicator to be both exposed to view. Now, if the next succeeding sale should be ten cents, the operation of the ten-cent key must automatically drop the dollar indicator and leave only the ten-cent indicator exposed. On the other hand, if the next sale should be one dollar, the operation of the dollar key must drop the ten-cent indicator and leave only the dollar indicator exposed. This operation is not only necessary, in order to prevent confusion in the indications, but it is *absolutely essential* to the practical utility of the indicating mechanism and the commercial value of the machine, for this reason: If the operation of any one of the keys did not automatically drop out of view all other exposed indicators, and leave exposed only the one corresponding to such key, then, whenever two indicators were exposed to view at the same time, in indication of a sale exceeding one dollar, if the next succeeding sale should happen to be for the same amount a dishonest clerk could operate the key corresponding to *either one* of the exposed indicators and register the value of the one key only, but leave both indicators exposed to view in indication of the full amount of the sale. Thus, in the instance above supposed, with the dollar indicator and the ten-cent indicator exposed to view in indication of a sale of one dollar and ten cents, if the next sale should amount to one dollar and ten cents the clerk might operate only the ten-cent key and register ten cents. Both indicators would remain exposed and correctly indicate the full amount of the sale, the alarm would be sounded to call attention to the indication, and the money drawer would be unlocked and thrown open, if the machine were provided with one; but the clerk would have charged himself with only ten cents upon the registering mechanism, and be obliged to account for but ten cents to the pro-

prietor. And he would be able to defraud the proprietor in this manner with almost no risk whatever of detection, for even though the customer and bystanders should be directly watching him it would be exceeding difficult for them to see whether he had pressed both keys or only one. Moreover, they would not often be paying any attention to the machine until the alarm sounded, and then the operation would have been completed, the proper indicators would be exposed, and all opportunity for detection would be gone.

A third essential feature of operation, therefore, and one found in both complainant's and defendants' machines, consists in the automatic release at each operation of all exposed indicators except that corresponding to the operated key, no matter whether the indicator of that key at the beginning of the operation be up or down. Under such operation it is impossible for two exposed indicators to remain in view at a given operation unless the clerk presses both keys and adds both amounts upon the registering mechanism, and in that event he is obliged to account to the proprietor for the full amount of the sale.

The Patented Invention—The Ritty & Birch Machine.

Having explained the general nature and purpose of cash-registering machines, and pointed out the essential requisites of their indicating mechanisms, it will next be in order to consider the patent in suit, and determine what the patented invention is. This court has explained the course to be pursued in approaching questions of this character, as follows:

> "In this, as in most patent cases founded on alleged improvements in machines, in order to de-

termine what is the thing patented it is necessary to inquire:

"1. What is the structure or device described by the patentee, as embodying his invention?

"2. What mode of operation is introduced and employed by this structure or device?

"3. What result is attained by means of this mode of operation?

"4. Does the specification of claim cover the described mode of operation by which the result is attained?"

Winans v. *Denmead*, 15 How., 341.

Let us therefore inquire, first, what the structure shown and described in the patent is; second, what its mode of operation is; third, what results are attained by it; and, finally, whether the claim of the patent covers said structure and its mode of operation.

The Ritty & Birch Machine.—This machine has been described by complainant's expert, Mr. See, at page 11 of of the record, and more fully by Mr. Renwick at pages 59 to 63; by defendants' expert Mr. Webster at page 26, and more at length by Mr. Shepard at pages 42 to 47. It has also been admirably and clearly described by Judge Acheson in his opinion in the Philadelphia case, at pages i to iii of the Appendix to this brief. Its indicating mechanism, which is the only part of the machine in controversy, may be briefly explained here.

The working parts of the machine are inclosed in a suitably shaped case, which has a glass-covered window in its upper rear portion, for the exposure of the indicators, and through openings in the front side of which case project the front ends of the operating keys, each bearing a number representing its value. These operating keys consist of levers fulcrumed on a transverse rod in the forward part of the machine and adapted to play up and

down in guides at their rear ends when their front ends, outside the case, are depressed and released. Arranged in guides over the rear ends of the levers are a series of vertical rods, one immediately over or resting upon the end of each lever, and each carrying at its upper end an indicator consisting of a thin plate or tablet bearing a large number corresponding to that upon the front end of its corresponding key-lever.

Under this construction and arrangements of the parts, when the front end of any lever key is depressed the indicator carried by the rod at its rear end will be lifted into view at the window in the upper part of the casing. If this were all of the mechanism, the indicator would drop back out of view as soon as the pressure upon the front end of the key-lever was removed. But, as we have seen, it is important that the indicator shall remain exposed until the next sale is registered, or at least until the customer and bystanders shall have had full opportunity to observe it. To this end, therefore, the machine is provided with means for holding up the indicator after it has been lifted by the operation of the key. This means consists of a movable bar adapted to catch under a projection upon the indicator-rod when the latter is lifted, and support the same in elevated position, with its indicator exposed to view. This movable supporting-bar, under the arrangement shown in the patent and as employed in complainant's machine, extends across the rear side of the row of rods, above their projections, and is pivoted at its opposite ends, near its lower edge, to the side frames of the machine, so that its upper edge is free to swing forward and backward toward and from the rods. A spring connected to the bar pulls its upper edge forward and yieldingly holds it in normal position. When the front end of any key-lever is depressed to its full

limit and its indicator-rod lifted, the projection on said rod will be carried above the front edge of the bar, and when the key-lever is released the rod will drop back until its projection catches upon the edge of the bar, which thereupon arrests the descent of the rod and holds the indicator in exposed position.

If this were all of the mechanism, when any indicator rod was lifted by operating its key the projection upon the rod would contact with the inclined forward side of the bar and push the upper edge of the bar back out of the way as the projection passed it, and then the spring would pull the bar forward again under the projection, so that when the key-lever was released the rod would be caught and supported by the bar.

Now, this mechanism alone would be amply sufficient for the purpose of automatically catching and holding up the lifted rod, with its indicator exposed to view; and this much of the Ritty & Birch mechanism, as shown by the record and as found by Judges Acheson and Butler and expressly stated in their opinion (Appendix, p. ii), was old in the art, in various forms, at the date of the patented invention. But we have seen that it is not only necessary that the lifted indicator shall be caught and held in view, but that the one previously exposed shall be released and dropped out of view, and that this shall be done with *absolute certainty*. Under the construction thus far described, and assuming the projections upon the rods to be of the same size, the projection upon one rod would push the supporting bar back just as far as would the projection on any other rod, so that when any rod was lifted its projection would, in theory at least, move the supporting bar from under the projection of the previously lifted rod resting upon it; but in practice it is found, for many reasons, that this operation cannot be relied upon for the

release of the exposed indicator. In the first place, the most extreme accuracy in construction and most perfect adjustment of the parts would be originally necessary in order to carry out the operation, even in theory, and after that the slightest excess of wear on the projections of a few of the most frequently used rods, or upon the supporting bar at their points of contact with it, would cause said projections to move the bar a less distance than they originally did, and the operation of any one of such rods would consequently fail to release any less used rod whose unworn projection might be resting upon the bar. So any accumulation of dust or dirt or oil upon the projections or bar would render the operation utterly unreliable. This fact is agreed upon by the experts for both parties, and is fully explained by Mr. Patterson, the superintendent of complainant's factory, at page 93 of the record. Judge Acheson clearly states it in his opinion in the Philadelphia case (Appendix, p. iv). Judge Colt also recognizes the fact and refers to it in his opinion, at page 218 of the record, as follows:

> "In previous devices it was found that if the shoulders upon the rod became clogged with dust, you could not always rely upon the falling of the tablet when the key was pressed and another tablet raised, and that consequently two tablets might be in sight of the customer at the same time. The object of the Ritty & Birch patent was to remedy this defect."

Ritty & Birch overcame this defect by adding to the machine, above described, and which was old, a train of mechanism interposed directly between the operating keys and the supporting bar, for transmitting motion from the keys directly to the bar and moving it at each operation of the machine, regardless of any movement which might or might not be given it by the shoulder or projection

upon the lifted rod. By this means the bar was given a uniform movement at each operation of the machine, no matter how the projection upon the lifted rod might be worn or how the parts might be clogged with dust or dirt, and this insured the release of the previously lifted rod with absolute certainty. This single train of mechanism is common to all of the keys, and is set in motion whenever any one of them is operated, and no matter whether the tablet of the operated key is up or down. It is of such character and so constructed that when the front end of any key-lever is depressed the mechanism first moves the supporting bar to its full limit, to release any rod whose projection may be resting upon the bar, and then becomes disconnected, to permit the spring to pull the bar forward again into position to catch the newly lifted rod when the operated key is released and the rod begins to fall. It thus not only moves the supporting bar to release the exposed indicator, but also disconnects itself during or at the end of the downward stroke of the operated key and upward movement of the rod, so that the spring may pull the bar forward in ample time for it to catch under the shoulder of the lifted rod when the latter begins to descend. It will be understood from this description that it is wholly immaterial to the mode of operation or the result accomplished whether the shoulder of the rising rod contacts with the supporting-bar during its upward movement or not, and that whether it will or will not so contact with the bar depends simply upon the adjustment of the parts, and not in any way upon their construction or mode of operation. If the train of mechanism disconnects itself before the shoulder of the rising rod has passed above the supporting bar, the latter, when the spring pulls it forward, will strike against the shoulder, and as soon as the shoulder clears it the bar

will catch under it. On the other hand, if the adjustment be such that the train of mechanism does not disconnect itself until the shoulder of the rising rod has passed above the supporting bar, the latter, when pulled forward by the spring, will of course move under the shoulder without contacting with it until the key is released and the shoulder drops back upon it. The result of releasing the exposed indicator and of catching and supporting the newly lifted one is precisely the same in both cases, as is the operation of the train of mechanism.

The essential characteristics of this connecting mechanism between the keys and supporting bar are that it is common to all of a number of keys, and is set in motion by depressing any one of them; it is interposed directly between the keys and supporting bar, and transmits motion directly from the keys to said bar, cutting out or shunting the tablet-rods in such operation; its action in moving the supporting bar is entirely independent or regardless of any action of the shoulders of the rods in moving said bar; it moves the bar a uniform distance at each operation of the machine, no matter what key is depressed, and no matter whether the tablet of the operated key is up or down, and moves it a greater distance than the shoulders upon the rods could be depended upon to do; and, lastly, after it has given the bar its full movement and released the exposed indicator, it becomes disconnected by one of its parts slipping past another, and thereby releases the supporting bar and permits the spring to return the bar to normal position in time to catch under the shoulder of the lifted rod and support its indicator in exposed position.

It accomplished two results in the combination in which it was employed, one old and one new. It accomplished

the old result in an entirely new way in effecting the release of the exposed indicator with certainty when another indicator is lifted into view, this broad result having been attained in the Pottin machine, hereafter referred to, by an independent device interposed between each tablet-rod and the supporting bar for that purpose. It accomplished a new result, by actuating the supporting bar directly from the keys, in that at each operation it effects the release of all exposed indicators except the one corresponding to the operated key, no matter whether the tablet of the operated key is up or down; so that if two indicators should have been exposed at once in indication of the preceding sale, as heretofore explained, the operation of the key corresponding to either one of them will release the other indicator and drop it out of view, thus making it impossible to keep both indicators in view except by operating both keys and adding the values thereof upon the registering mechanism.

The first claim of the Ritty & Birch patent here in controversy is drawn to the combination of the keys, the shouldered rods and indicators (called tablet-rods and tablets in the patent), the supporting bar (called the supporting wing in the patent), and the connecting mechanism between the keys and said bar, as follows:

> "1. In a registering and indicating machine, the combination, with a series of indicating tablets operated by a series of keys, of a series of rods, each provided with a detent or shoulder and carrying one of the aforesaid tablets, and a supporting-wing with connecting mechanism, whereby upon operating any one of the keys the wing is so moved as to permit the passage of the rod, and whereby upon the release of the key the wing engages with and holds up the tablet-rod and tablet, substantially as described."

There is nothing novel or peculiar about the construc-

tion of any of these elements; nor in the combination of all of them together without the train of mechanism between the keys and supporting bar. The keys are of the ordinary sort employed in machines of this character. The indicators or tablets are simply thin plates having numbers painted upon them—a well-known form of indicators. The tablet-rods are simply straight rods for supporting the tablets—such as had previously been used for the same purpose. The shoulders or detents are simply projections on the rods. Similar rods, carrying similar indicators and provided with similar projections, were old. The supporting bar or wing is simply a flat bar or plate movable into and out of the path of the projections on the rods. In the patent it is pivoted so as to move in the arc of a circle. It was old in this form, and it was old as a sliding bar mounted to move in a straight line in suitable guides. Defendants' experts have testified that trains of mechanism similar to that interposed by Ritty & Birch between the keys and supporting bar were old for other purposes, and this may be assumed to be true, since the claiming of elements in combination impliedly admits them to be old individually. Each element of the combination may, therefore, be said to have been old at the date of the Ritty & Birch invention, and that invention to have therefore consisted in a new combination of five old elements, under a certain co-operative law, as follows:

1. A series of operating keys.
2. A series of shouldered rods.
3. A series of indicators or tablets.
4. A supporting bar or wing.
5. A connecting mechanism.

The function of the keys is two-fold, to lift the rods and operate the connecting mechanism; this double function is

essential, while the form of the keys is not. The function of the shouldered rods is to communicate the lifting power of the keys to the tablets, and furnish shoulders by which the latter may be caught and supported on the bar or wing; these two functions are essential, while the form of the rods and the form of the shoulders are not. The function of the supporting bar or wing is to catch under the shoulder of any rod that is lifted and hold its tablet in view, and to move from under the shoulder of such rod and drop its tablet when another rod and tablet are lifted by the operation of another key; and this double function is essential, while the form of the supporting bar is not. The function of the train of mechanism between the keys and supporting bar is to transmit motion directly from the keys to said bar, so as to move said bar a uniform distance at each operation of the machine, regardless of any movement which may or may not be given it by the shoulder of the lifted rod, and to release said bar and permit its spring to pull it back to normal position in time to catch under the shoulder of the newly lifted rod. Its duty is thus to give the supporting bar its proper movement to enable it to perform its double function before mentioned, to wit, to release the exposed indicator with absolute certainty, and to catch and support the newly lifted one. The function of this mechanism, and its mode of operation in the combination, are essential, but the form of the mechanism and the number of its constituent elements are not.

This mode of operation, by which when any key is depressed the power applied to the key is divided and transmitted in two directions—acting in one direction, through the tablet-rod, to lift the tablet into view, no matter what the position of the supporting bar may be, and acting in the other direction, through the connecting mechanism, to

insure the proper movement of said bar, no matter what may or may not be done by the shoulder of the tablet-rod —constitutes the principle of the invention.

The Prior Art—Its Bearing Upon the Patented Invention.

Having now examined the structure shown and described in the patent, and come to an understanding of its mode of operation and the results attained by it, and having found that the claim in suit covers said structure and its mode of operation, it will next be in order to inquire what bearing the prior art has upon the patented invention—to determine what actual advance in the art the patentees made.

The record shows:

1. That the five elements above enumerated and covered by the claim in suit were never, in any shape or form, combined before.

2. That the mode of operation of the combination—the principle of the invention—never existed before.

3. That the new combination accomplishes an old result in a much better manner than it was ever before accomplished, and also accomplishes a new result of the highest importance in this class of machines.

To state it more specifically, there had never before existed the combination of a series of keys of any sort, a series of tablet-rods and tablets of any sort, and a supporting bar of any sort, with a mechanism of any sort interposed between the keys and supporting bar and transmitting motion directly to said bar, to move it regardless of any action or non-action of the tablet-rods upon it.

The proposition may be put even more broadly: There

had never existed prior to the Ritty & Birch invention a series of keys, a series of indicators, and a means of any sort whatever for holding up the indicators, combined with a connection of any kind for transmitting motion directly from the keys to such upholding means, instead of transmitting it thereto through the medium of the indicators themselves or their supporting devices.

To illustrate, the claim might have been drawn in the following language without any conflict with the prior art:

> "The combination of a series of indicators, a series of keys for moving them into exposed position, means for temporarily holding them in such position, and a connection between the keys and said up-holding means for moving the latter directly from the keys, for the purpose described."

We desire to emphasize these statements, for we shall not enter upon a detailed discussion of the various patents which have been put in evidence by defendants as representing the prior art. We fearlessly and confidently make the statements, and are willing to rest our case upon them. They will be found not only unequivocally supported by the record, but they are in strict accordance with the finding of Judge Acheson in the Philadelphia case. As heretofore stated, Judges Acheson and Butler had before them Judge Colt's opinion and a copy of the record in the Boston case, and everything contained in both the Boston and the Philadelphia records was urged upon the court with all the earnestness of the able counsel who represented the defendant in the latter case. We quote the following from Judge Acheson's opinion on the prior art relating to the Ritty & Birch invention (Appendix, pp. iii–v):

> "The evidence satisfies us that this combination was absolutely new, and that it gives to the machine increased efficiency, and, indeed, a new capability,

completely remedying serious defects. It is highly important when a key is operated, and its rod and tablet are elevated, that any tablet-rod already up and resting by its shoulder upon the supporting bar shall be released, so that the tablet may disappear. But in actual practice with the old machines operated by a separate mechanism for each key of a series, it was found that the shoulder of the rising tablet-rod frequently failed to move the supporting bar sufficiently to effect the liberation of the tablet-rods already up, by reason of a lack of perfect adjustment of the parts, the wear of the same, or the clogging by dirt. This difficulty was effectually overcome by the Ritty & Birch invention, which interposes a train of mechanism, common to the whole series of keys, between them and the supporting bar, so that whenever any key is depressed the connecting mechanism is set in motion and thereby the supporting bar is moved so far back as to insure the disengagement and fall of any tablet-rod whose shoulder may be resting upon it. It must be conceded that previously means had been employed—namely, a series of pivoted latches or levers, one for each tablet-rod, co-operating with the shoulders of the rods—to move the supporting bar further away than could be done by the shoulders themselves. But it is also true that Ritty & Birch were the first to accomplish this result with entire certainty of operation, and by means altogether different, both as respects construction and mode of operation, from the old devices, thus perfecting the machine in this regard. Again, we think the evidence shows that Ritty & Birch achieved, also, an important new result, certainly one which before had never been accomplished in any practical way. As we have seen, the connecting mechanism of the patent takes power directly from any key of the series, and moves the supporting bar (the wing I) independently and regardless of any actuation of it by the shouldered tablet-rods. Now the supporting bar is thus moved even by the operation of a key whose tablet-rod is already up, with its shoulder above and resting on the supporting-bar. But, plainly, without the con-

necting mechanism this could not be done. This new capability is of great practical benefit. For example, in the absence of the connecting mechanism, if two tablets are up in indication of the amount of a prior sale, and the next sale should happen to be for the same amount, or for the larger of the two sums, the operator may strike the key corresponding to the smaller sum and sound the alarm, but register only the value of that key. But in the supposed instance, the Ritty & Birch device would compel honest registry, for by the pressure of the key of the one tablet-rod the other becomes disengaged, and falls certainly."

THE PRIOR ART RESTS ENTIRELY UPON PAPER—NO PRACTICAL MACHINES EVER MADE OR USED.

The prior art shown in the record, even bearing as remotely as it does upon the Ritty & Birch invention, *rests entirely upon paper*. The testimony of Mr. Patterson (Record, pp. 90–91) shows that there were no machines of this class—no cash registers and indicators in any way resembling the Ritty & Birch and defendants' machines—upon the market or in use in this country at the time the complainant began manufacturing its machines under the Ritty & Birch patent. He also testifies from his personal knowledge that there were no such machines in use in England or France; and as to the Pottin patent—an English patent granted to a Frenchman living in Paris, and the one most relied upon by defendants as anticipating or limiting the Ritty & Birch invention—Mr. Patterson testifies to the personal statement of the inventor that there never was but one such machine built, and that was simply a model. (Record, p. 91.)

THE RUSSELL, POTTIN AND CAMPBELL PATENTS.

Of the large number of patents put in evidence by defendants, they have laid particular stress upon two, the

Pottin and the Campbell, and have not contended that any of the others have more than a remote bearing upon the Ritty & Birch invention. We shall, therefore, refer in detail to only these two patents, and to one other, the Russell, which latter was put in evidence by complainant.

The Russell Patent.

Notwithstanding it is an elementary principle of mechanics, and even a matter of common knowledge, that where two elements of a mechanism perform the same duty, in the same way, and differ only in the fact that one swings on a pivot while the other slides in a guideway—that one reciprocates in the arc of a circle while the other reciprocates in a straight line—they are mechanical equivalents, or in substance the same thing; notwithstanding this well-known fact, some of defendants' experts contended so strenuously that the pivoted supporting bar of the Ritty & Birch machine is a very different thing from the sliding bar performing the same duty in the same way in defendants' machine, and testified so positively that the novelty of the invention lay solely in this pivoting of the bar, that complainant put in evidence the patent to Russell, found at pp. 106–108 of the record. This patent shows a series of indicators having bevelled or rounded shoulders co-operating with a pivoted plate or wing, precisely as the shoulders of the tablet-rods in the Ritty & Birch machine co-operate with the pivoted supporting bar or wing of that machine, or as they would co-operate with it in the absence of the connecting mechanism between the keys and bar. This indicating device of the Russell patent as a whole is substantially the same thing as the Ritty & Birch machine *without* its connecting mechanism; the parts differ simply in form and arrange-

ment, but their mode of operation and the result accomplished are exactly the same.

The Pottin Patent.

The Russell patent shows a *pivoted* supporting bar, while the Pottin patent (Record, pp. 102–106) shows a *sliding* bar for the same purpose. The Pottin machine more closely resembles the Ritty & Birch machine in form than does that of the Russell, because its tablets are supported upon vertically sliding shouldered rods and its operating keys are lever-keys; but with the trips or latches hereafter referred to omitted from its supporting bar it would be in substance the same thing as the Russell machine, and the same thing as the Ritty & Birch machine without the latter's connecting mechanism. Pottin foresaw that if he relied solely upon the engagement of the shoulders of the tablet-rods with the supporting bar to effect the proper movements of said bar to release the exposed tablet and catch and support the newly lifted one, there could be no certainty in the operation of the mechanism, for the reasons heretofore given in connection with the Ritty & Birch machine. He therefore pivoted a series of trips or latches upon his supporting bar, one adjacent each tablet-rod, and adapted to co-operate with the shoulders of the rods in such manner that the shoulder of a rising rod would move the supporting bar further than it could have been moved by a direct engagement of the shoulder with the bar, in the absence of such trips or latches, so that when one tablet-rod was lifted its shoulder would so move the supporting bar as to effect the release of any other rod whose shoulder might at the time be resting on the bar.

These devices of the Pottin machine were intended for *one* of the purposes of the connecting mechanism in the

Ritty & Birch machine, to wit, the release with certainty of the exposed indicator when another was lifted into view, and it may be assumed for the purpose of this case that such devices would satisfactorily accomplish that result. The existence of this Pottin machine and its mode of operation and the result intended to be accomplished have been recognized in our statements heretofore made, that one of the features of the Ritty & Birch invention consists in the accomplishment of an old result—the release of the exposed indicator with certainty—by entirely new means and in a superior manner.

It is not necessary to refer to the testimony of experts or mechanics to show that the single train of mechanism interposed between the keys and supporting bar of the Ritty & Birch machine is a much cheaper, simpler and better means for effecting this result than are the series of latches pivoted upon the supporting bar of the Pottin machine. The Ritty & Birch machine, as illustrated in the patent, has twenty keys, so a Pottin machine with the same number of keys would require twenty latches pivoted upon its supporting bar. Many machines made by complainant under the Ritty & Birch patent contain forty keys, so that a corresponding machine made according to the Pottin patent would require forty latches instead of the single train of mechanism of the Ritty & Birch machine. Each latch in the Pottin machine occupies a considerable space transversely of the machine, and if the machine had twenty keys, as has the Ritty & Birch machine, it would be several times as wide as the latter machine, while if it had forty keys it would bear more resemblance in size to a piano than a cash register. Each latch in the English machine must automatically reset itself after it has been moved by the downward passage of the shoulder of the adjacent rod; if it does not so

reset itself, the supporting bar will not be properly moved the next time such rod is lifted, so that the intended operation of the machine will be defeated. In the patent the latches are made heavier on one side of their pivots than on the other, and gravity is depended upon to reset them; but the slightest accumulation of dirt, or gumming of oil upon the pivots of the latches, would prevent such operation, and if springs were added to more positively reset the latches, they would serve only to increase the number of the parts and the complexity of the machine.

The above points, however, only go to the defects of the Pottin machine in the matter of economical construction, convenience in size, and ability to stand the wear and tear of practical use; but aside from all this it is manifest that the means employed by Ritty & Birch for effecting the old result of releasing the exposed indicator with certainty, to-wit, the train of mechanism interposed directly between the keys and supporting bar and acting upon the latter independently of the shoulders of the rods, is a wholly different thing from the devices in the Pottin machine for the same purpose; that it has a radically different mode of operation and would have constituted a patentable invention if its only purpose and effect had been the accomplishment of this old result in such a superior manner.

But this is not all, for inasmuch as the shoulders upon the tablet-rods are the only means for moving the supporting bar in the Pottin machine, so that motion can be transmitted from the keys to the supporting bar only through the tablet-rods, it follows that if two keys are operated at once and their corresponding rods lifted and caught upon the supporting bar by their shoulders, in indication of a sale represented by the two indicators com-

bined, a subsequent operation of either one of those keys will fail to release either indicator, and both will remain exposed to view. The shoulders of both rods are above and resting upon the supporting bar, and as those shoulders are the only thing which can move the bar, the latter can be moved and the indicators released only by operation of some other key. Pottin realized this fact, but made no attempt to overcome it in the automatic operation of the machine, for he simply extended one end of each supporting bar through the side of the casing of the machine and fastened a knob upon it, so that when he could not get the exposed indicators down any other way he might do so by pressing one of these knobs, just as the Russell patent describes a similar means for moving its pivoted supporting bar for the same purpose. It will be readily seen that this Pottin machine is open to fraudulent manipulation by dishonest clerks in the manner heretofore explained, and as referred to by Judge Acheson in the paragraph from his opinion which has been quoted.

As regards this Pottin machine, therefore, the Ritty & Birch machine accomplishes everything it does in a much superior and wholly different manner, and further accomplishes an entirely new result by overcoming a difficulty recognized in the Pottin patent, but which Pottin made no effort to meet.

This Pottin contrivance was simply a paper invention, as shown by the testimony of Mr. Patterson heretofore referred to. Pottin lived in Paris and the patent was taken out in England, but no machine was ever put into use in either country, and according to Pottin's statement nothing but a model was ever built.

The Campbell Patent.

The second patent urged by the defendants in the Circuit Court, as a limitation of the Ritty & Birch invention, is that to Campbell (Record, p. 115). In this patent the indicators or tablets consist of vertically sliding plates mounted at their edges between guides upon the rear wall of the casing (Figure 4 of the drawings of the patent), and each having at its upper end a laterally projecting finger. Pivoted at their upper ends to the wall of the casing, above these tablets, are as many swinging hooks as there are tablets, each adapted to co-operate with the finger on the upper end of the tablet below it. These hooks all pass through a transverse sliding bar, mounted at its ends in guides upon the wall of the casing and pressed by a spring in one direction. This bar and spring operate to yieldingly hold all the hooks in normal position. The means for lifting the tablets into view and engaging their fingers with the hooks, to support them in exposed position, consists of a series of key levers connected by cords and pulleys at their rear ends with sliding lifting rods beneath the respective tablets.

This is all of the indicating mechanism of the Campbell machine. Its intended operation is that when any tablet is lifted by depressing the front end of a key-lever the finger on its upper end will be caught by the hook above it and the tablet be thereby held in exposed position, and that when another key is operated and its tablet lifted into engagement with its hook the latter will, through the medium of the sliding bar connecting all the hooks, so move the other hook as to disengage it from the first lifted tablet and permit the latter to drop out of view.

Now, at best, assuming that the construction shown will successfully carry out this operation, it is evident

that we have here nothing more than the Pottin machine without its latches, or the Ritty & Birch machine without its connecting mechanism. There is no connection whatever between the key-levers and the tablet-supporting devices, except *through* the tablets themselves—no direct connection of any kind between the keys and upholding means which *shunts* or *cuts out* the lifting rods and tablets.

Differing as does the upholding means of the Campbell patent from that of the Ritty & Birch, yet, if the Campbell machine contained any sort of mechanism interposed between the keys and upholding means for transmitting motion from the keys directly to such means and moving it independently or regardless of any movement of it by the tablets themselves, it might have an important bearing upon the Ritty & Birch invention and materially limit the claim in suit; but it has no such mechanism, nor any suggestion of it.

This, we say, is all that can be claimed for the Campbell patent under the most favorable view of it; but it is evident from a study of the patent that the construction shown will not successfully produce the mode of operation intended by it. For instance, there must necessarily be more or less play between the several hooks and the sliding bar at the points where the hooks pass through the bar, so that if a simple bar like that of the Ritty & Birch machine cannot be so moved by the shoulder of a rising rod as to release the upheld rod with certainty, it is manifest that the hooks in the Campbell machine could not be; particularly if it contained twenty hooks, as would be required by the twenty-key machine of the Ritty & Birch patent, or forty hooks, as would be necessary in the forty-key Ritty & Birch machines put upon the market.

Furthermore, it is shown by the testimony of Mr. Patterson that, while complainant (who owns this patent) has made use of its automatic drawer mechanism, it has never attempted to use its indicating mechanism, and is of the opinion that its complexity renders it impracticable—certainly so in comparison with the Ritty & Birch mechanism. Mr. Patterson also testifies, from personal knowledge, to the fact that there are no such indicating mechanisms in use or upon the market, and to the statement of the inventor himself that the original model was the only machine containing such mechanism that was ever built. (Record, p. 95.)

Defendants' counsel contended in the court below that if the keys in the Campbell machine were depressed hard enough, and the tablets lifted higher than would be necessary to simply engage their fingers with the swinging hooks, then all of the hooks would be so moved at each operation, through the medium of the sliding bar, as to certainly release the upheld tablet or tablets; and that even if two tablets should be exposed at the same time, a severe blow upon the key corresponding to either one of them would cause it to so shake or move all of the hooks as to release the other tablet. This contention was earnestly pressed upon Judges Acheson and Butler in the Philadelphia case and rejected by them, as is seen by the statement in Judge Acheson's opinion "that Ritty and Birch attained also an important *new* result; certainly one which before had never been accomplished in any practical way."

But the point is not material in any event, for, if the clerk did *not* depress the key hard enough to move the tablet higher than necessary to simply engage it with its hook and expose it to view, the other tablet would not be

released, even under defendants' contention, and it is not reasonable to suppose that a dishonest clerk, who wished to defraud the proprietor, would be at any special pains to so operate the machine as to thwart his own ends. If machines of this character must be operated in strict accordance with instructions, and in a particular and careful manner, their proper use would depend entirely upon the will of the clerk, and their very purpose be defeated. For practical utility, the question is not whether the machine can be *made* to operate *properly*, but whether under any circumstances it can be made to operate *improperly*. Even admitting the correctness of defendants' contention, the operation in the Campbell machine is a mere *capability*, while in the Ritty & Birch machine it is a *necessity*. In the Campbell machine it is optional with the clerk; in the Ritty & Birch machine it is compulsory. In the Campbell machine the clerk *may* drop the exposed tablet when he lifts another into view, but in the Ritty & Birch machine he cannot lift a second into view *without* dropping the one exposed. In the Campbell machine, if the one-dollar tablet is exposed to view and the next sale is $1.10, the clerk can operate the ten-cent key and lift the ten-cent tablet into view and cause it to be engaged and held up by its hook, without dropping the dollar tablet, and thus correctly indicate the full amount of the sale, but charge himself with only ten cents upon the mechanism within the machine. Such a mechanism would be absolutely worthless for practical use.

The Campbell machine, like the Pottin, says to the clerk, "*Please* keep a true record of the sales you make." The Ritty & Birch machine says to him, "You *must* do it, or I will detect you and report you to the proprietor."

OTHER PATENTS PUT IN EVIDENCE BY DEFENDANTS.

The remaining patents put in evidence need not be discussed in detail. It is enough to say that no one of them shows even a series of shouldered tablet-rods lifted by keys and co-operating with a supporting bar; much less such elements in combination with a connecting mechanism interposed between the keys and supporting bar, and having the function or mode of operation of the Ritty & Birch mechanism. No one of them shows an indicating mechanism in the remotest degree resembling that of complainant's or defendants' machine. They were apparently put in evidence to show that there were a great number of old mechanisms which could be substituted for the Ritty & Birch connecting mechanism in complainant's machine; and for this purpose complainant may welcome them. The Ritty & Birch invention consists in the combination of five elements, one of which is the connecting mechanism. The more *known substitutes* for that element existing at the date of the invention, the broader the construction which should be given the claim.

Defendants' Machine.

Having now considered what the invention shown and described in the patent in suit is, and determined its novelty in view of the prior art, it will next be in order to examine defendants' machine, and compare it with that of the patent, for the purpose of determining whether it embodies the mode of operation and attains the results of the patented invention.

In defendants' machine the keys representing amounts in cents are arranged in a set at the right side of the machine, while those representing amounts in dollars are

arranged in a second set at the left side. The registering mechanisms of the two sets of keys are distinct from each other, but the indicators of the two sets co-operate with the same supporting bar, so that when a key in either set is operated any exposed indicator belonging to the other set will be dropped out of sight, the same as if it belonged to the set containing the operated key. Each set of keys and its co-operating devices constitute a complete machine, and either one may be considered in comparison with complainant's machine, or both may be considered together as one mechanism. All of the tablet-rods and tablets, except two, in the left-hand or dollar set, and the registering mechanism belonging to such set, were removed from the machine by complainant's expert, Mr. See, before the machine was put in evidence, in order to more clearly expose the working of the parts. (Record, pp. 12–13.) Since the machine was put in evidence, six years ago, the paper numbers have dropped off the indicating tablets, but it will be understood that each tablet bore a number corresponding to that upon its key; the numbers upon the keys still remaining.

The keys consist of levers fulcrumed in the lower forward part of the machine, the same as in complainant's machine. Over the rear end of each key is a vertically guided tablet-rod carrying a tablet at its upper end, bearing a number corresponding to that on its key, as in complainant's machine. Upon the front side of each rod is a lug or projection having a beveled upper side and an abrupt lower side, as have the projections or shoulders on the rear sides of the rods in complainant's machine. Mounted to slide transversely of the machine upon the front side of the framework which supports the tablet-rods is a long bar, extending across the front sides of the tablet-rods of both sets and pulled in one direction by a

spring which yieldingly holds it in normal position. This sliding bar has upon its rear side a series of lugs, one over the lug upon the front side of each tablet-rod, and each having a beveled under side corresponding to the beveled upper side of the lug beneath it.

THE CONNECTING MECHANISM IN DEFENDANTS' MACHINE.

As above described, the machine is substantially the same, element for element, as the Russell machine, or the Pottin machine without its latches, or the Ritty & Birch machine without its connecting mechanism; and its mode of operation, and its defects and shortcomings, are precisely the same as those of the Ritty & Birch machine without such mechanism. Without something corresponding to the Ritty & Birch connecting mechanism it would be absolutely worthless as a practical indicating machine. Such mechanism is found in the flat plates overlying each set of keys and the intermediate parts connecting these plates with the sliding supporting bar. Each plate is hung by short side arms or ears upon the fulcrum shaft of the key-levers, precisely as in the corresponding plate or bar in the Ritty & Birch machine. In the latter machine the bar is located beneath the keys in front of their pivots, while in defendants' machine it is located above the keys in rear of their pivots; the two positions are exactly the same in substance, the bar in each case being arranged in the path of the keys so as to be moved by the operation of any one of them. Projecting from the left-hand end of the bar or plate is a pin which passes through a curved slot in the lower forward end of an angle lever, which is pivoted at its angle to the upper end of a post or standard upon the base of the machine. This lever fits loosely upon its pivot, so that it is not only free to swing upon its pivot in a plane transverse to its axis, but can also

wabble thereon slightly from side to side. A spring connected to its lower end yieldingly holds it in and returns it to normal position. Formed upon the rear end of the lever is a double-faced cam which co-operates with a cam of similar shape upon the front side of an arm formed integral with and depending from the sliding supporting bar. Whenever the cross-bar or plate above the keys is lifted by depressing the front end of any key-lever, the angle-lever is rocked on its pivot and its rear end thrown downward. The cam upon its rear end is of such shape that at this downward movement it presses against the right side of the cam upon the pendent arm of the supporting bar and forces the latter to the left against the stress of its spring. When the cam upon the lever clears the lower end of the cam upon the arm of the supporting bar the latter is released and is pulled back to normal position by its spring. When the key-lever is then released, and the cross-bar which has been lifted by it is permitted to drop back to normal position, the angle-lever returns with it to normal position. As its rear end rises its cam contacts with the bevelled lower side of the cam upon the arm of the supporting bar and moves upward upon the left side of said cam, the loose pivotal support of the angle-lever above referred to permitting this movement of its rear end. As it clears the upper end of the cam upon the arm of the supporting bar it moves slightly to the right, ready to travel downward upon the right side of the cam at the next operation of the machine, and again force the supporting bar to the left.

The result of this direct connection of the keys with the supporting bar is that whenever any key-lever is depressed the bar is moved from under the shoulder of any rod which may be resting upon it, releasing it and per-

mitting its tablet to drop out of view, and is then released and thrown back to normal position by its spring in time to catch under the lug upon the newly lifted rod and support its tablet in view when the operated key is released.

OPERATION OF DEFENDANTS' MACHINE *WITHOUT* ITS CONNECTING MECHANISM ILLUSTRATED, AND COMPARED WITH THAT OF THE RITTY & BIRCH MACHINE WITHOUT *ITS* CONNECTING MECHANISM.

That this connection between the keys and supporting bar performs precisely the same duty in substantially the same way as the connecting mechanism in the Ritty & Birch machine may be demonstrated by pulling the rear end of the angle-lever to the left, and holding it out of co-operation with the cam upon the supporting bar while several keys are operated. It will then be found that the operation will be as follows: Upon depressing the front end of a key and lifting its tablet-rod the lug upon the latter, as the rod rises, will contact with the lug above it upon the supporting bar, and will force the latter aside, against the resistance of its spring, until the lugs clear each other, whereupon the spring will throw the bar back to normal position and carry its lug beneath that upon the rod. When the operated key is released the tablet-rod will drop back until its lug contacts with that upon the supporting bar, which latter will then support the rod and hold its tablet exposed to view. Upon operating a second key its lug will likewise contact with the lug above it on the supporting bar and force the latter aside as it passes, and the spring will then pull the bar back to normal position, and its lug will support the second rod and tablet when the key is released. The lifting of the second rod may or may not have released the first rod, depend-

ing upon what particular keys were operated in succession. If the lug of the second rod pushed the supporting bar aside a little further than did that of the first rod, the latter will have been released, otherwise not; but in any event it will be found, upon operating several more keys in succession, that the lug of the rising rod cannot be depended on at all to release the previously lifted rods, and when half a dozen keys have been operated quite a number of rods will remain up, with their tablets exposed to view.

This is precisely the case in the Ritty & Birch machine when the connecting mechanism between the keys and supporting bar is omitted or thrown out of operation, and would wholly defeat any useful operation of the machine.

Again, with no rods elevated in defendants' machine, if two keys are depressed at once, their rods will be lifted and caught by the supporting bar. Now, if the angle-lever be held out of action as before, it will be found that either one of these keys may be operated *ad infinitum*, without releasing either its own or the other tablet, precisely as is the case in the Ritty & Birch machine when its connecting mechanism is absent.

Defendants' machine, without its connecting mechanism between the keys and sliding supporting bar, would, therefore, be open to all the fraudulent manipulations by dishonest clerks which have been heretofore referred to. If, with one tablet up in indication of the preceding sale, the next sale should be such that the exposed tablet could be used as a part of the new indication, the clerk could operate the second key and lift the necessary second tablet, thereby exposing the proper indication to the customer, but charging himself with only part of it, to-wit,

the amount or value of the last operated key. If the one-dollar tablet should be up, and the next sale should be one dollar and ten cents, or fifteen or twenty cents, he could simply depress the ten, fifteen or twenty-cent key, collect the full value of the sale from the customer, who would see the proper amount indicated and suppose it to have been also registered, and pocket one dollar of it himself. So, with two tablets exposed, a succeeding sale of the same amount could be properly indicated by operating the key corresponding to either one of them, and registering only the value of the one key.

THE TWO CONNECTING MECHANISMS, THEIR MODES OF OPERATION, AND THE RESULTS ACCOMPLISHED BY THEM IN THE COMBINATION, SPECIFICALLY COMPARED.

Defendants' machine, without its connecting mechanism, thus corresponds exactly to complainant's machine without its connecting mechanism, and the defects in its operation are overcome in exactly the same way and by identically the same means by which Ritty & Birch, for the first time in the art, overcame them. They are overcome by interposing between the keys and supporting bar a train of mechanism which performs the same duty as the Ritty & Birch mechanism, and nothing more, and performs it in the same way and has all the characteristics of that mechanism heretofore pointed out. It is common to all the keys of the set and is put in motion by depressing any one of them; it is interposed directly between the keys and supporting bar, and transmits motion directly from the keys to said bar, cutting out or shunting the tablet-rods in such operation; its action in moving the bar is entirely independent or regardless of any action of the shoulders of the rods in moving said bar; it moves the bar a uniform distance at each operation of

the machine, no matter what key is depressed and no matter whether the tablet-rod of the operated key is up or down, and it moves the bar a greater distance than the shoulders upon the rods could be depended upon to do; and, lastly, after it has given the bar its full movement and released the exposed indicator, it becomes disconnected, by one of its parts slipping past and escaping another, and thereby releases the bar and permits the spring to pull it back to normal position in time to catch under the shoulder of the lifted rod and support its tablet in exposed position.

In both complainant's and defendants' machines, and in the form employed in each, the combination of elements without the connecting mechanism was old in the art, and in both forms it was worthless for practical purposes. In both cases the same element was added to the same old combination for the same purpose and with the same result. In both cases the connecting mechanism is put into the same combination, in the same relation to the other elements, to take power from the same source, at the same time and under the same circumstances, transmit it to the same destination by the same road, and apply it to the same element of the combination, for the same purpose and with the same effect. Operate any key of either the Ritty & Birch or defendants' machine, and what that key will do to the supporting bar, by the action of the connecting mechanism in the one machine, it will do equally well and in the same way by the action of the connecting mechanism in the other machine. Remove the connecting mechanism from complainant's and defendants' machines, and you have left in both machines the same combination of elements, operating in the same way and presenting the same difficulties and shortcomings. Add the connecting mechanism to each machine, and you have in both

the same new combination of elements, operating in the same new way and accomplishing the same results. Hold out of operation the connecting mechanism in either machine, and then operate a key, and that key will bring about the same co-operation of elements and accomplish the same results in the one machine as in the other. Release the connecting mechanism in either machine and permit it to operate, and then depress a key, and that key will then bring about the same new co-operation of elements and accomplish the same new results in the one machine as in the other.

FORMAL DIFFERENCES BETWEEN THE TWO MACHINES—BUT THE RITTY & BIRCH INVENTION HAD NOTHING TO DO WITH *FORM*.

The form of the supporting bar and the form of the connecting mechanism are not the same in one machine as in the other; but the novelty of the Ritty & Birch invention did not reside in the *form* of their supporting bar or in the *form* of their connecting mechanism, any more than in the form of the keys or tablet-rods. Their combination of elements had never existed before with *any* form of supporting bar and *any* form of connecting mechanism having the function or mode of operation of those elements in their combination. The combination was broadly new, regardless of the particular form of the several elements, and in no event could the novelty of their combination be predicated upon the *form* of the supporting bar or connecting mechanism, for the form of their supporting bar was undoubtedly old in the art, and the form of their connecting mechanism, independently and in other combinations, is claimed by defendants' own experts to have also been old. What Ritty & Birch did was to take an old form of supporting bar and an old

form of connecting mechanism (just as they took an old form of keys, an old form of tablets and an old form of tablet-rods) and place them in a new combination, where they co-operated with each other and the other elements, in a manner never before thought of, and accomplished results never before accomplished.

DEMONSTRATION OF THE FACT THAT DEFENDANTS' CONNECTING MECHANISM IS BUT A DIFFERENT FORM OF THE RITTY & BIRCH MECHANISM.

Some of the ways in which the form of the connecting mechanism may be varied, even in using it with a pivoted supporting bar, are illustrated in the patents which were put in evidence by complainant in connection with Mr. Patterson's deposition, at pages 92 and 93 of the record, said patents being found at pages 152 to 215 of the record. They illustrate various forms of the connecting mechanism, all having the same mode of operation, however, and serving the same purpose and accomplishing the same result, as the particular mechanism shown in the Ritty & Birch patent. Some of these mechanisms more nearly resemble in form that found in defendants' machine, while others differ from it in form to as much or a greater extent than does the specific mechanism shown in the patent. Illustrative, however, of the fact that the form of connecting mechanism found in defendants' machine is in substance the same thing as the Ritty & Birch mechanism, and that it is varied only as was necessary to accommodate it to a transversely moving bar, instead of a backwardly and forwardly moving one, we call attention to the Heady & Patterson patent at page 176 of the record. In the drawing opposite said page it will be seen that the connecting mechanism there employed between the keys and pivoted supporting bar consists of the cross-

bar I hung by side arms J upon the shaft B and resting upon the upper sides of the keys in rear of their pivots, as in defendants' machine; and a bent lever A' pivoted to the frame-work at *q*, connected at its front end by a slot and pin to a depending extension of one of the arms J, and carrying at its upper rear end a trip bearing against a plate, *m*, carried by an arm, *n*, secured to and projecting upward from the left-hand end of the supporting wing, the arm *n* and plate *m* being thus in substance a part of the supporting wing. When the bent lever A' is rocked upon its pivot by depressing one of the keys, the trip *k* at its upper rear end bears against the plate *m* and pushes the wing backward until the nose of the trip slips off the lower end of the plate *m*. This permits the spring to throw the wing forward to catch under the shoulder of the lifted rod, and when the key is released and the lever A' returns to normal position the trip *k* flips under the plate *m* and resets itself ready for the next operation.

If this mechanism be compared with that in defendants' machine it will be found that they are not only the same in substance, mode of operation and purpose, as are also defendants' mechanism and the Ritty & Birch form of mechanism, but that they are the same *in toto*, and in number of parts, differing only in the fact that one acts upon a backwardly and forwardly movable bar, and the other upon a transversely movable bar. The cross-bar I with its side arms J, and the bent lever A', are identically the same as the cross-bar or plate and its side arms, and the bent lever in defendants' machine, and arranged and connected in the same manner; while the upwardly extending arm *n*, forming part of the wing, is the same thing as the downwardly extending arm forming part of the sliding bar in defendants' machine; the plate *m*, which is simply a bearing surface, corresponds exactly to the

cam upon the lower end of the pendent arm in defendants' machine, while the trip *k* upon the end of the lever *A'* corresponds to the cam upon the rear end of the bent lever in defendants' machine, and the pivotal movement of said trip upon the lever, to permit the trip to reset itself, corresponds to the wabbling movement of the bent lever for the same purpose in defendants' machine.

This patent serves to demonstrate that the connecting mechanisms in the Ritty & Birch and defendants' machines are not essentially different things, but differ only in form, and that the Ritty & Birch mechanism may be varied in form in such a way, even in connection with a pivoted supporting bar, as to correspond, *in form*, to defendants' mechanism.

Another of the patents to Heady & Patterson (Record, p. 184) shows another way of varying the form of the connecting mechanism, and still further reducing the number of its parts. As there shown (Figures 3 and 13 of the drawings), the connection between the cross-bar or plate and the wing consists of a single member—a long bent arm, *s*, pivoted at its front end to one of the side arms of the cross-bar, and having at its rear end a shoulder which co-operates with a stud, *u*, upon the end of the wing (or upon the arm moving with the end of the wing). When a key is depressed this long arm is moved rearward and pushes the wing backward until the end of the arm is lifted by riding over a fixed cam, *w* (Figure 13), whereupon the shoulder slips off the pin and releases the wing, and permits the spring to throw it forward to catch the lifted tablet-rod.

Construction of the Claim—Judge Colt's Error.

In *Winans* v. *Denmead* this court said it was the *mode of operation* of a patented device which gave it "the character of an invention," and that its mode of operation "*is the thing entitled to protection.*" Judge Colt utterly ignored the mode of operation of the Ritty & Birch combination, and devoted his entire attention to the specific construction of its individual elements. He does not once mention or refer to its mode of operation in his entire opinion; but, losing sight of the real invention, and seeking for it in the separate elements of the combination, he holds that the claim in suit must be restricted to a *pivoted* supporting bar for the tablet-rods, and to the *specific form* of the train of mechanism between the keys and said bar.

He understood and clearly stated the object of the invention, and construed the claim to cover the combination of five elements heretofore discussed, to wit, the keys, the tablet-rods, the tablets, the supporting bar and the train of mechanism between said bar and the keys. He also found the purpose and effect of this train of mechanism to be to move the supporting bar regardless of any movement of it by the shoulders of the rods, and thereby release the lifted rods with certainty; but he was misled into thinking that the novelty of the claim depended upon novelty in its individual elements, instead of novelty in the combination as a whole. He overlooked the fact that the broad combination of elements, and their mode of operation, had never before existed in *any* form, and sought to find the invention in the construction of the individual elements. Thus he says (Record, page 218):

> "At the date of the Ritty & Birch invention it is admitted that cash registers were old. A series of

keys, rods and indicating tablets are to be found in the prior English Pottin patent of May 28, 1877, and in the Campbell patent of February 14, 1882. In these machines we find an indicating mechanism which in its general features is the same as that of the patent in suit. The most, therefore, that Ritty & Birch can claim, in view of the prior state of the art, is an improvement upon the Pottin and Campbell registers, and that improvement consisted in devices whereby it was made certain that the preceding tablet would fall when another tablet came into view.

"In previous devices it was found that if the shoulders upon the rods became worn, or the machine became clogged with dust, you could not always rely upon the falling of the preceding tablet when the key was depressed and another tablet raised, and that consequently two tablets might be in sight of the customer at the same time. The object of the Ritty & Birch patent was to remedy this defect. This was done by means of the wing and connecting mechanism, whereby the support which holds the tablet-rods up is pressed so far away from the shoulders of the rods that they are sure to fall by the force of gravity.

"It is contended that all Ritty & Birch are entitled to under their patent is the specific mechanism, or its equivalent, by which this improvement was accomplished, and the only question in this case is whether the court should give such a broad construction to the first claim of the patent as to cover the defendants' device. I am of opinion that, in view of the prior state of the art, the Ritty & Birch patent must be confined to the specific mechanism, or its equivalent, which go to make up the combination covered by the first claim of the patent. The only novel feature in that claim is the supporting wing with connecting mechanism, and the question, therefore, narrows itself down to this: Do the defendants in their machine use these devices, or well-known equivalents thereof? I do not find in the defendants' register the wing and connecting mechanism of the Ritty & Birch patent."

He says the defect in the prior machines was remedied

in the Ritty & Birch machine "by means of the wing and connecting mechanism."

Now it is evident that the wing in itself had nothing to do with remedying the defect. The defect would exist, and did exist, in machines employing a pivoted supporting bar or wing, to precisely the same extent and for precisely the same reasons as in machines employing a *sliding* bar. This is demonstrated by the Russell patent (Record, p. 107), in which a wing or pivoted plate co-operates with the shoulders upon the indicator supports. It is therefore clear that it was not the substitution of a pivoted bar for a sliding bar that remedied the defect and brought about the new mode of operation, for such mere substitution would have accomplished nothing whatever toward that end. Nor is it correct to say that it was the "wing *and* connecting mechanism" which accomplished it, for the new mode of operation resulted *wholly* from the introduction of the connecting mechanism into the combination. The change from a sliding to a pivoted bar did not and could not have anything to do with it.

If, for the foundation of their invention, Ritty & Birch had selected the Pottin or Campbell machine, with their sliding bars, instead of a machine having a pivoted bar, the introduction of the connecting mechanism into the combination containing the sliding bar would have had identically the same effect and accomplished precisely the same result as did its introduction into the combination containing the pivoted bar.

Judge Colt says the result was accomplished "by means of the wing and connecting mechanism, whereby the support which holds the tablet-rods up is pressed so far away from the shoulders of the rods that they are sure to fall by the force of gravity." Now this expression indicates

confusion, for the wing is itself the "support" referred to, and it can hardly be said that the "wing and connecting mechanism" operate to move the *wing*—that the wing operates to move itself. If Judge Colt had stated that the introduction of the connecting mechanism alone remedied the defect and accomplished the new results, he would have stated the fact and avoided confusion, for such fact is conclusively shown by the record, is self-evident from the machine itself, and was so found by Judges Acheson and Butler in the Philadelphia case, and is forcibly stated in their opinion. (Appendix, p. iv.)

Again, referring to the claim in suit, Judge Colt says: "The only novel feature of that claim is the supporting wing with connecting mechanism." Now this is at least misleading, for if by novel "feature" he meant novel "element," as the language would indicate, the statement was not correct, for neither of these elements was novel in itself. The record shows that the wing was not, and defendants' own experts testify that the connecting mechanism was not. The connecting mechanism is the novel feature of the claim in the sense that its addition to the old combination produced a *new combination* and brought about a new mode of operation; but this is not the sense in which Judge Colt used the expression, as is apparent from his comparison of the claim with defendants' machine. He meant that the claim depended for novelty upon *pivoting* the supporting bar, and upon novelty in the construction of the connecting mechanism. This was plainly an error, for we have seen that the claim not only does not *depend* upon a pivoted bar, but that the use of such bar cannot possibly confer any novelty upon it; while as to the connecting mechanism, it is evident that the claim would have set forth a broadly new combination, possessing an entirely new mode of operation.

no matter *what* the form of the connecting mechanism might have been, and no matter whether it had been new or old *per se*.

It being elementary law that a new combination of old elements may be just as patentable, and constitute an invention as highly useful and meritorious, as a combination containing *new* elements, there was no necessity in going beyond the new *combination* set forth in the claim and seeking for novelty in its individual elements. The several elements being claimed *only* in combination, the law presumes them to have been old *per se*, or in other or different combinations, and the discussion of the novelty or lack of it in them individually is not pertinent to the issue. (The Corn Planter patent, 23 Wall., 181, 224.)

Reasons for Not Restricting the Claim to a Pivoted Supporting Bar.

Judge Colt erred in restricting the claim to a pivoted supporting bar, (1) because the prior art did not require it; (2) because pivoted and sliding bars, or other pivoted and sliding members, are recognized equivalents and substitutes for each other in mechanics where one will do the work of the other; (3) because the record shows that pivoted and sliding bars were *known substitutes* for each other *in this particular art* at the date of the Ritty & Birch invention, and for the very purpose for which they are employed in complainant's and defendants' machines; (4) because there is nothing in the specification of the patent, or in the language of the claim in suit, requiring such restriction; (5) because, when so restricted, the claim fails to protect the actual invention made by the patentees.

1. The prior art not only did not *require* such restric-

tion of the claim, but, as we have seen, such restriction of it is inconsistent with such art.

2. Complainant's expert, Mr. See, whom the record shows not only to have had a long experience as an expert in patent cases, but to have been a practical machinist and to now be a consulting engineer of large practice, states as a fact that "it was common in the arts where a movement of approach or recession was wanted to arrange the part in question to work alternatively in bearings of reciprocation or in bearings of oscillation." (Record, p. 16, A. 16.) Complainant's other expert, Mr. Renwick, who is well known to this court, and has perhaps had a longer and larger experience as a mechanical expert than any other man in the United States, also expressed his unqualified opinion that the two forms of supporting bar are well-recognized mechanical equivalents.

3. The record shows, and Judges Acheson and Butler found, that a *pivoted* bar or plate co-operating with shoulders upon the indicator supports, precisely as the pivoted bar in complainant's machine would co-operate with the shoulders upon the rods in the absence of the connecting mechanism, was old in the indicating mechanism of the Russell patent, while the *sliding* form of bar employed in defendants' machine was old in the Pottin patent, thereby proving these two arrangements of the bar to have been *known substitutes* for each other in the art of indicating mechanisms at the date of the Ritty & Birch invention.

4. There is nothing whatever in the specification of the patent, or in the claim, to restrict the invention to the use of a pivoted bar or technical "wing." The word "wing" was used in the specification as a natural and proper term in referring to the pivoted bar, since such

pivoted bar is often called a wing in various branches of mechanics; but there is not a word in the specification to indicate that the patentees considered such a bar either necessary, or preferable to any other form of bar. They do not set forth any advantages for its use, but simply describe the actual mechanical construction and arrangements of the parts shown in the drawings, and in so doing naturally and properly refer to the pivoted bar as the "wing." The use of the word in the specification and claim affords no more reason for restricting the invention to a pivoted bar than would the use of any other descriptive term for any element of the machine require the invention to be restricted to the precise form and arrangement of such element. This court has laid down the rule, and it has been followed and become an elementary principle of patent law, that

> "In determining the question of infringement the court or jury, as the case may be, are not to judge about similarities or differences by the *names of things*, but are to look at the machines or their several devices or elements *in the light of what they do*, or what office or function they perform, and how they perform it, and to find that one thing is substantially the same as another if it performs substantially the same function in substantially the same way to obtain the same result." (*Machine Co.* v. *Murphy*, 97 U. S., 120.)

The same contention was urged in the Philadelphia case, where the defendants' machine employed a supporting bar sliding in guides at its opposite ends, instead of a pivoted bar or wing, but Judges Acheson and Butler rejected the contention and referred to it in their opinion (Appendix, p. vii) as follows:

> "It is, however, alleged that the defendant does not use the 'wing I' of the patent; but this is true only in the sense that the specific form of device

> therein shown is not employed. The first claim of the patent, however, does not call for any specific construction of this element of the combination, but for 'a supporting wing.' In fact, defendants' transverse supporting-bar performs the same function in the combination as the supporting wing of the patent, and its mode of operation is substantially the same; *for the intended purpose the two devices are essentially the same thing.*"

5. A restriction of the claim to a pivoted supporting bar would not enable it to cover and protect the actual invention made by the patentees, for it is manifest that that invention consisted in the introduction of the connecting mechanism into the old combination of keys, tablet-rods and tablets, and supporting bar, and had nothing whatever to do with the *form* of such bar.

This court, nearly forty years ago, laid down the law applicable to such cases as this, when it said:

> "Now, while it is undoubtedly true that the patentee *may* so restrict his claim as to cover less than what he invented, or may limit it to one particular form of machine, excluding all other forms, though they also embody his invention, *yet such an interpretation should not be put upon his claim if it can fairly be construed otherwise.* . . .
>
> "It is generally true, when a patentee describes a machine, and then claims it as described, that he is understood to intend to claim, *and does by law actually cover, not only the precise forms he has described, but all other forms which embody his invention;* it being a familiar rule that, to copy the principle or mode of operation described, is an infringement, *although such copy should be totally unlike the original in form or proportions.*
>
> . . . . . .
>
> "If the machine complained of were a copy, in form, of the machine described in the specification, of course it would at once be seen to be an infringement. It could be nothing else. It is only ingenious diversities of form and proportion, *presenting*

> *the appearance of something unlike the thing patented*, which give rise to questions; *and the property of inventors would be valueless* if it were enough for the defendant to say, your improvement consisted in a change of form; you describe and claim but one form; I have not taken that, and so have not infringed." (*Winans* v. *Denmead*, *supra*.)

Judge Acheson but followed the holding of this court in the above and many subsequent cases when he stated in his opinion that, if defendant could use complainant's invention with impunity, and escape the patent by the formal variations it had made, "then was the grant of the patent a vain thing."

Reasons for Not Limiting the Claim to the Specific Form of the Connecting Mechanism.

Judge Colt likewise erred in restricting the claim to the specific form of the connecting mechanism, and for substantially the same reasons.

1. There is nothing in the prior art requiring such restriction, for we have seen that the combination was broadly new with *any* form of connecting mechanism which would perform the same duty in the combination. It was not the *specific* connection of the keys with the supporting bar which was *new* with Ritty & Birch; it was the *connection*—any connection—of them, by which motion could be transmitted directly from the keys to the bar, for the purpose and with the results set forth. It was not the addition of *their* specific mechanism, or any other particular mechanism, which created the new combination and brought about the new mode of operation; it was the addition of any mechanism *which would do the work* in the combination.

2. There is not a word in the specification which lays any stress on the particular form of the mechanism which the patentees employed, and which sets forth any necessity for or advantage in using such specific mechanism instead of any other which would serve its purpose. The specification states what the essential *mode of operation* of the machine is, and then proceeds to simply describe the mechanical devices shown in the drawings, by which such operation is brought about. One of these devices, so described, is the connecting mechanism, and the only requirement as to its construction, under the specification, is that it shall be capable of producing, or contributing its part to, *the mode of operation* of the combination which is stated to be essential.

So far as the claim is concerned, the element is expressed in the broadest possible terms. The patentees might have referred to it as "a train of mechanism interposed between the keys and supporting wing," or as a "direct connection between the keys and supporting wing," or by any other suitable expression; but nothing could have been any broader than the words "connecting mechanism" which they did use.

3. The claim should not have been restricted to the specific form of the connecting mechanism, for defendants' connecting mechanism, or any other connecting mechanism which will perform the same duty in the same way, is obviously its mechanical equivalent *in this combination*. It is so, not only as a matter of mechanics, but is so under repeated decisions of this court, which has held in many cases that two very dissimilar devices or mechanisms may be equivalents of each other *in analogous combinations*, when they would not be equivalents of each other *out of* such combinations.

Cochrane v. *Deener*, 94 U. S., 780, involving the flour-bolting apparatus, is directly in point. Some parts of defendants' apparatus differed radically from the corresponding parts of complainant's apparatus, but in the broad combination claimed they each performed the same duty in bringing about the same general mode of operation, and were held to be equivalents. Speaking by Mr. Justice Bradley, the court said:

> "Though some of the corresponding parts of the machinery, designated in this combination, are not the same in point of form in the two bolting apparatuses, and, *separately considered*, could not be regarded as identical or conflicting, yet *having the same purpose in the combination*, and effecting that purpose *in substantially the same manner*, they are the equivalents of each other *in that regard*. The claim of the patent is not confined to any particular form of apparatus, but (in regard to the valves, for example) embraces generally any valve for feeding and delivering the meal without allowing the air to pass through. We are of opinion, therefore, that the combination here claimed is infringed by the apparatus used by the defendants."

Blake v. *Robertson*, 94 U. S., 728, involving the stone-crusher, is another case directly in point. There the invention consisted of a new combination, composed of two converging crushing jaws, one stationary and one movable toward and from the other, a revolving shaft, and a toggle mechanism interposed between the shaft and the movable jaw, to impart motion to the latter. The patent claimed broadly the combination of the two jaws, the revolving shaft, and "mechanism" for imparting movement from the shaft to the movable jaw. The court held the patent to cover defendant's machine, in which the "mechanism" between the revolving shaft and the movable jaw consisted of a confined body of water, a plunger

and a ram. Speaking of defendant's machine, the court said:

> "In the appellant's model the revolving shaft is not shown. In their machine it works the plunger of the pump, from which the water is conveyed to a cylinder behind the movable jaw, whence it is applied to that jaw by means of a ram, the ram taking the place of the piston in an ordinary engine. *Thus the vibrating arm, the toggle, the toggle-joint, and the pintals in the Blake machine are dispensed with*, and their place supplied by the hydraulic arrangement we have described. What is so employed in the appellant's machine *is the obvious and exact equivalent* of what is so dispensed with in the Blake machine."

4. The claim should not have been restricted to the specific mechanism, because, according to defendants' own testimony, there were other forms of similar mechanisms which could be readily substituted for the patentees' mechanism in the new combination. In other words, the restriction of the claim by the court below excluded from its scope *known substitutes* of its several elements, contrary alike to the first rules of construction applicable to combination claims, and to sound reason. If at the date of the Ritty & Birch invention there were in existence, as claimed by defendants, numerous forms of connecting mechanisms which might readily be substituted for the specific mechanism shown in the patent—which any skilled mechanic would see at a glance *could* be so substituted—is it equitable or reasonable to hold that any infringer may appropriate the patentees' invention, but escape the patent, by simply adopting one of these known substitutes which he finds ready-made to his hand?

> "When, in mechanics, one device does a particular thing, or accomplishes a particular result, every other device *known* and *used* in mechanics, which experienced workmen know will produce the same result, or do the same particular thing, is a mechanical

substitute for the first device mentioned for doing the same thing or accomplishing the same result, although the first device may never have been detached from its work and the second one put in its place. *It is sufficient to constitute known mechanical substitutes that when a skillful mechanic sees one device doing a particular thing, that he knows the other devices, whose uses he is acquainted with, will do the same thing.*" (*Carter* v. *Baker*, 4 Fish., 404.)

5. From what has been last said above, it is evident that the restriction of the claim by the court below affords no protection whatever to the actual invention, and makes the patent worthless. If the public are at liberty to use the patented combination by merely changing the form of one of its elements, or by employing a known substitute for it, it is manifest that the grant of the patent was, in the language of Judge Acheson, "a vain thing."

Or, if any one who devises a *new* form of connecting mechanism which may be substituted for that of the patent, and which will perform the duty of the old mechanism in the same way, is at liberty thereupon to appropriate the patented combination by substituting such new form of mechanism, the invention is likewise taken from its owners. Complainant itself has from time to time varied and improved upon the specific form of mechanism shown in the patent, as appears from the testimony of Mr. Patterson (Record, p. 92). Of the fifteen or sixteen thousand Ritty & Birch machines which he says were made and sold by the complainant between the date of the patent and the taking of his testimony, it appears quite probable that, while all of them contained and were based upon the Ritty & Birch *combination*, a large number of them may not have employed the specific form of the connecting mechanism shown in the patent.

6. The claim should not be restricted to the specific

form of the connecting mechanism, because such restriction changes the form and character of the claim. Judge Colt construed the claim, in respect to the connecting mechanism, as though the claim read as follows:

> "In a registering and indicating machine, the combination, with a series of indicating tablets operated by a series of keys, of a series of rods, each provided with a detent or shoulder and carrying one of the aforesaid tablets, the supporting wing, the transverse bar K underlying the front ends of the keys and hung by side arms J J upon the pivot shaft of the keys, the lever *m* pivoted to the side of the frame, the link *p* connecting said lever and the upward extension of one arm J, the bent arm or elbow L pivoted to the side of the frame and bearing against the wing I, and the follower *j* hung upon the pivot of the arm L and co-operating therewith and with the lever *m*."

Such construction or reading of the claim makes each piece or part of the connecting mechanism a substantive element of the claim, so that instead of a claim for a combination of five elements, of which the connecting mechanism as a whole is one, we have a claim for a combination of ten or more elements. Now, the claim for the combination of five elements, and the claim for the combination of ten elements, are radically different claims, subject to different rules of construction, and of widely different scope. Each will be infringed by a combination containing all of its elements, or their equivalents or known substitutes; but in the one case the infringing combination need contain only the equivalent or known substitute of the connecting mechanism *as a whole*, while in the other it must contain the equivalents or known substitutes *of each separate element of it*. In the latter case, if the machine in question dispenses with any single piece or part of the connecting mechanism, it will not infringe.

That this is the construction placed upon the claim by Judge Colt is clear from his opinion, where, in comparing defendants' machine with that of the patent, he says: "Nor do we find the same connecting devices, such as the flat arms J, link, trigger and bent lever L, with follower." (Record, p. 218.)

Such construction of the claim is unwarranted, and is in direct conflict with the holdings of this court in *Cochrane* v. *Deener*, *Blake* v. *Robertson*, *Morley* v. *Lancaster*, and many other similar cases.

7. The claim should not be restricted to the specific mechanism, for the patent contains another claim for such specific mechanism in combination with the wing. The fourth claim of the patent is for

> "The wing I, in combination with the trip L, trigger *m*, link *p* and arm J, substantially as and for the purpose specified."

This court has held that two claims of a patent based upon the same structure or mechanism should not be construed to mean the same thing—that the presence of a narrowly stated claim requires the broader construction of a more broadly stated claim—and the Circuit Courts have followed such holding until it has become a well-established and universally recognized rule of construction.

Silsby v. *Foote*, 14 How., 225; *Cohansey Glass Co.* v. *Wharton*, 28 Fed. Rep., 190; *Tondeur* v. *Stewart*, 28 Fed. Rep., 564; *Dederick* v. *Siegmund*, 42 Fed. Rep., 842; *Smead* v. *School District*, 44 Fed. Rep., 614; *National Cash Register Co.* v. *American Cash Register Co.*, 53 Fed. Rep., 367; *Page Fence Co.* v. *Land*, 49 Fed. Rep., 936.

8. The claim should not be restricted to the specific mechanism, because that is the construction which would

have to be given it if the broad combination and mode of operation had been old with some *other* form of connecting mechanism. Judge Colt construed the claim precisely as he would have been obliged to do had the combination of keys, tablet-rods and tablets, supporting bar and *some* form of the connecting mechanism been old in the art. If, subsequent to Ritty & Birch's invention, some one devised an *improved form* of connecting mechanism, and put it into the combination in place of the Ritty & Birch mechanism, and obtained a patent for it, then the claim of such patent would be entitled to precisely the same construction which Judge Colt gave the Ritty & Birch claim. But Ritty & Birch were not simply improvers of an old connecting mechanism, or of an old combination. They created a broadly *new* combination, which had never existed in any manner, shape or form—whose mode of operation had never before been accomplished by *any* combination of devices. They claimed their new combination and new mode of operation broadly, and there is no warrant for so restricting their patent as to render it *non-infringeable* without making a Chinese copy from its drawings.

Judge Colt Misled by Differences in Form and Appearance.

In searching for the infringement in defendants' machine, Judge Colt apparently had his mind filled with the *shape* and *appearance* of the several parts of complainant's machine, and sought to find corresponding parts of similar shape and appearance in defendants' machine. He looked for a *pivoted* supporting bar, arranged precisely as in complainant's machine, and found a sliding bar instead. He looked for shoulders upon the rods formed by

bending the rods themselves, and he found instead shoulders formed by lugs fastened to the rods. He looked for a connecting mechanism having a transverse *bar* arranged *beneath* the keys in *front* of their pivots, and he found a transverse *plate* arranged *above* the keys in *rear* of their pivots. He looked for such a bar hung upon the pivot shaft of the keys by side supports long enough to be called "arms," and he found the plate in defendants' machine hung upon such a shaft by arms so short that he had to call them "lugs." He looked for a flat arm projecting upward from this bar, to connect with the train of mechanism leading to the wing, and he found instead a round arm or rod projecting laterally from the plate for the same purpose. And, finally, he looked for a train of mechanism composed of exactly the same number of pieces, each of the same shape, and arranged in the same position and connected together in the same manner as in the drawings of the patent, and he found instead a mechanism having a less number of pieces, of different shapes and arrangement.

That he had his mind upon these formal differences is evidenced by the language of his opinion, in which he mentions and lays more or less stress upon them.

He saw that the sliding supporting bar had a different appearance from complainant's pivoted bar; but he forgot that the two bars perform the same duty in substantially the same way, that sliding and pivoted members are recognized equivalents in mechanics where they will do the same work, and that the record shows that in this particular art sliding and pivoted bars for holding up indicators were known substitutes for each other.

He saw that complainant's rods were arranged in a single straight row, and that defendants' rods were arranged in several different rows; but he forgot that the

different lengths of the lugs upon the rods and bar in defendants' machine bring its rods into precisely the same relation to the bar as if the rods were arranged in a single row and the lugs made of equal lengths.

He saw that in complainant's machine the single row of rods had their tablets bent to overlap each other, so as to permit the rods to be compactly arranged laterally of the machine, as stated in the patent; but he forgot that in defendants' machine the arrangement of the *rods* in different rows, with their tablets overlapping each other, is for the same purpose and accomplishes the same result.

He saw that the shoulders on complainant's rods were formed by bending the rods, while those on defendants' rods consisted of lugs fastened to the rods; but he forgot that the shoulders in each case are simply rigid projections upon the rods, both having bevelled upper sides and abrupt lower sides, and serve precisely the same purpose, to-wit, to catch upon the supporting bar and hold up the rods.

He saw that in complainant's machine the transverse bar, which is common to all the keys and actuates the connecting mechanism, was arranged beneath the keys in front of their pivots, while in defendants' machine the corresponding member was arranged above the keys in rear of their pivots; but he forgot that the two arrangements are in substance exactly the same, and that the bar in each case is placed in the same relation to the keys, to-wit, in their path of movement, so as to be moved by the operation of any one of them.

He found the transverse member in complainant's machine called a "bar," and to be in fact a bar, while in defendants' machine he found the member to be wider and thinner, so as to be properly called a "plate;" but he

forgot that a *thin* bar is a plate and a *thick* plate a bar.

He found that in complainant's machine the bar is hung by "arms" at each of its ends to the pivot shaft of the keys, while in defendants' machine it is similarly mounted by "lugs" upon its ends; but he forgot that the "lugs" are simply short "arms," or the "arms" long "lugs," and that the difference in the length of them in the two machines is due solely to the fact that in complainant's machine the bar is located a little further from the shaft than in defendants' machine, and that it does not affect their operation in the slightest degree.

He saw that in complainant's machine there was a flat arm projecting upward from one end of this bar, while in defendants' machine there was a round arm or rod projecting laterally from the corresponding bar or plate; but he forgot that the sole purpose and duty of both arms is to connect the bar with the mechanism leading to the tablet-supporting bar.

And, finally, he saw that in complainant's machine this mechanism consisted of a short lever connected to the flat arm by a link, and a swinging elbow or arm, with a follower, pressed by the upper end of said lever against the tablet-supporting bar, while in defendants' machine it consisted of a lever, a pendent arm fast upon the supporting bar, and co-operating cams upon said arm and lever; but he forgot that the duty of the link in complainant's mechanism is simply to connect the short lever with the upper end of the flat arm of the cross-bar—to bridge the space between them—while in defendants' machine the long bent lever connected directly to the round arm or rod projecting laterally from the bar or plate serves the purpose of *both* the link and the short lever of complainant's machine; that the cam upon the rearwardly projecting end of the long bent lever in defendants' machine, the arm

depending from the supporting bar and the cam upon said arm, serve precisely the same purpose as the upper end of the short lever and the pivoted elbow or arm and the follower in complainant's machine, and that they operate in precisely the same manner and accomplish the same result, to-wit, they push the supporting bar aside, to release the exposed tablet, and then escape each other, by one sliding upon and slipping past the other, thereby releasing the bar and permitting its spring to reset it and catch the lifted tablet-rod when the key is released and the rod begins to fall.

Judge Colt saw all the differences of form, but none of the similarities in substance; all of the differences in appearance, none of the identity in purpose and function. In his search for sameness in form, he lost sight of sameness in mode of operation. In looking for the *invention* in defendants' machine, *he forgot what the invention—its essence and principle—was.*

The language of this court in *Winans* v. *Denmead*, *supra*, was pressed upon his attention, but defendants answered that *Winans* v. *Denmead* was forty years old, and, if not obsolete, was at least of doubtful authority; and the opinion of the court indicates that it acquiesced in the reply.

It is needless to say that this occurred before the recent decision of this court in *Electric Co.* v. *La Rue*, 139 U. S., 601, reaffirming the doctrine of *Winans* v. *Denmead*, and declaring that for forty years—ever since the decision was rendered—it had been "the settled doctrine of this court."

The Claim as it Actually Appears in the Patent, and the Claim as Judge Colt Read it.

In the patent the claim reads as follows:

> "In a registering and indicating machine, the combination, with a series of indicating tablets operated by a series of keys, of a series of rods, each provided with a detent or shoulder and carrying one of the aforesaid tablets, and a supporting-wing with connecting mechanism, whereby," etc.

The restrictions which Judge Colt placed upon the claim, and the manner in which he compared complainant's machine with defendants' in his opinion, show that he read the claim as follows:

> "In a registering and indicating machine, the combination, with a series of indicating-tablets operated by a series of keys, of a series of rods, each provided with a detent or shoulder formed by bending the rod itself, and each carrying one of the aforesaid tablets, the forwardly inclined supporting bar or wing I extending transversely across the machine behind the rods, and pivoted at its opposite ends to the side frames of the machine, the transverse bar K underlying the front ends of the keys and hung at its opposite ends by the arms J J upon the pivot-shaft D of the keys, one of said arms having an upward extension, the lever *m* pivoted to the side of the frame, the link *p* connecting the lower end of said lever with the upper end of the upward extension of the arm J, the bent arm or elbow L pivoted at its upper end to the side of the frame, and having the shoulder *k* and bearing at its rear end against the pivoted wing I, and the follower *j* hung upon the same pivot as the arm L and co-operating with the shoulder *k* thereof and with the upper end of the lever *m*, whereby," etc.

It is clear from his opinion that nothing will infringe the claim as it actually stands in the patent, unless it will also infringe the claim as above drawn.

The Construction Given the Claim was an Illiberal One, in No Way Commensurate with the Character of the Invention or the Actual Advance in the Art Made by the Patentees.

Judge Acheson says in the Philadelphia case, referring to the broadly stated combination of the claim in suit,

> "The evidence satisfies us that this combination *was absolutely new*, and that it gave to the machine increased efficiency, and, indeed, a new capability, completely remedying serious defects."

Again he says:

> "It must be conceded that previously means had been employed to move the supporting bar further away than could be done by the shoulders themselves. But it is also true that Ritty & Birch were the first to accomplish this result with entire certainty of operation, and by means *altogether different*, both as respects construction and *mode of operation*, from the old devices; thus *perfecting* the machine in this regard."

Further:

> "Again, we think the evidence shows that Ritty & Birch achieved also an important *new* result; certainly one which had never been accomplished *in any practical way*."

And, finally:

> "In our apprehension, the invention of Ritty & Birch *was one of more than ordinary merit*, and we cannot bring ourselves to the conclusion that their patent can be successfully evaded by such structural changes as the defendant has made. If it could be, then was the grant of the patent a vain thing."

This was Judge Acheson's and Judge Butler's view of the invention which Judge Colt held must be restricted to the specific mechanism shown in the drawings of the pat-

ent. Judge Colt appreciated the fact that he was giving the claim a very narrow construction—one which made it worthless, and one which was not in harmony with the decisions of this court in the cases to which we have referred, and to which we called his attention—and he mentioned the fact in his opinion as follows (Record, p. 220):

> "I know in a certain class of cases the Supreme Court have given a very liberal construction as to what constitutes an equivalent, but I do not think that either of the patents involved in these suits comes within that class of cases which deal with pioneer inventions."

Now, the limitations of a pioneer invention have never been defined, and it is not clear what Judge Colt's conception of such an invention was. He did not think the sewing machine in *Morley* v. *Lancaster* was a pioneer invention, and restricted the claims of the patent to the specific mechanisms composing the several combinations claimed; but this court thought differently, and construed the claims broadly, without restriction to the specific mechanisms. In the recent case of *Hoyt* v. *Horne*, *post*, he did not think the invention warranted a liberal construction of the patent, but again this court disagreed with him and reversed his decree.

But whatever his conception of a pioneer invention may have been, it is manifest, from his opinion in the present case, that he did not think an *improvement* upon an existing machine could ever constitute such an invention. He may have fallen into this error from a mistaken consideration of the opinion of this court in the Morley case, where the new combination of mechanisms constituted a new machine as a whole, and the court laid more or less stress upon such fact. He may have failed to see that in the Morley case the court simply condensed and empha-

sized its decisions in many prior cases to the effect that a *broad* invention is entitled to a liberal construction—that a broad invention, like a narrow one, should be given a construction commensurate with the actual advance in the art made by the patentee; and that many of the prior decisions which this court referred to in the Morley case related to inventions consisting in mere *improvements* upon pre-existing machines.

But, however he may have reached the opinion, it is certain that he entertained it, and applied it with fatal effect to the claim in suit in this case. He says:

> "At the date of the Ritty & Birch invention it is admitted that cash registers were old. A series of keys, rods and indicating tablets are to be found in" the Pottin and Campbell patents. "The most, therefore, that Ritty and Birch can claim, in view of the prior state of the art, is an improvement upon the Pottin and Campbell registers."

He then proceeds to hold that "*in view of the prior state of the art*, the Ritty & Birch patent must be confined to the specific mechanism."

His reasoning is that, cash registers being old, and the Ritty & Birch invention therefore consisting in an improvement upon such machines, it must be narrowly construed and restricted to details of construction.

We admit his premises, but deny his conclusions, both upon principle and authority. It is true that the Pottin and Campbell machines were old, at least on paper, at the date of the Ritty & Birch invention; and it is true that the Ritty & Birch invention consisted in an improvement upon those machines. But it does not follow, and is not true as a matter of fact, that their invention consisted in details of construction or that the patent must be so restricted.

The prior existence of such contrivances as the Pottin

and Campbell serves only to strengthen the Ritty & Birch invention, and to clearly show what they accomplished and what advance they made in the art. The very fact that there had been attempts to produce a practical cash register, and that such attempts had failed, and none of the devices gone into use—the *existence* of such machines as the Pottin and Campbell, which contained defects manifestly fatal to their practical use—these facts simply *prove* that Ritty & Birch accomplished something more than a change of form when they brought success out of failure and produced a successful and practical machine which has gone into wide use, both in this country and abroad.

Upon principle and reason, therefore, we say that Judge Colt's conclusion, from the premises stated, was unwarranted. Nor had he any warrant under the authorities of this court. This court has repeatedly held that claims for new combinations of old elements are entitled to as broad and liberal construction as claims for any other classes of inventions. *Bates* v. *Coe*, 98 U. S., 31; *Parks* v. *Booth*, 102 U. S., 96; *Blake* v. *Robertson*, 94 U. S., 728; *Cochrane* v. *Deener*, 94 U. S., 780.

Moreover, it has never hesitated to give a liberal construction to patents for *improvements* upon pre-existing machines, whenever the improvement involved a broad invention and constituted a decided step in advance in the art. Such was the case in *McCormick* v. *Talcott*, 20 How., 402; in *Machine Co.* v. *Murphy*, 97 U. S., 120; *Con. Valve Co.* v. *Crosby Valve Co.*, 113 U. S., 157; *Clough* v. *Barker*, 106 U. S., 166; *Yale Lock Co.* v. *Sargent*, 117 U. S., 536; *Hoyt* v. *Horne*, 145 U. S., 302.

In *McCormick* v. *Talcott* mowing machines were as old in the art in relation to the patented improvement as were cash registers in relation to the Ritty & Birch invention. The patented improvement consisted in the ad-

dition of the "divider," and the court held the invention to be a "pioneer" to the extent of this improvement and gave the patent a most liberal construction.

In *Machine Co.* v. *Murphy* the patented invention was an *improvement* in paper-bag machines, which were old and well known, yet the court applied the most liberal construction to the claim in controversy. Not only did it do this, but in its opinion it emphasized the fact that such machines were old, and that the patented invention was an improvement upon them; and it gave the claim a construction which covered a machine differing widely from the patented one in the construction and arrangements of its parts. The court said (Record, p. 122):

> "Machines for making paper bags are old, as both sides admit; and the evidence in this case shows *that they have been constructed by many persons and in various forms for more than twenty years*, and with more or less utility. Neither party in this case claims to be the original inventor of an entire machine of this kind; nor could such a claim, if made, be sustained, in view of the admitted state of the art. *Improvements in various parts of such a machine* are claimed by the assignor of the complainants.
>
> . . . . . .
>
> "*Wide differences exist in the arrangement of the devices composing the operative parts of the respondent's machine in question, from those exhibited in the machine of the complainants.*"

But this fact presented no difficulty to the court, which looked through form to substance, and laid down the rule applicable to such cases in the following language:

> "*Except where form is of the essence of the invention, it has but little weight in the decision of such an issue*, the correct rule being that in determining the question of infringement, the court or jury, as the case may be, *are not to judge about similarities or differences by the names of things*, but are to look at the machines or their several devices or elements

in the light of what they do, or what office or function they perform, and how they perform it, and to find that one thing is substantially the same as another if it performs substantially the same function in substantially the same way to obtain the same result, always bearing in mind that devices in patented machines are different in the sense of the patent law when they perform different functions or in a different way, or produce a substantially different result.

"Nor is it safe to give much heed to the fact that the corresponding device in two machines organized to accomplish the same result is different *in shape or form* the one from the other, as it is necessary in every such investigation to look at the *mode of operation* or the way the device works, *and at the result*, as well as at the means by which the result was obtained."

In the above case the prior art had a much stronger bearing upon the patented invention than in the case at bar. It did not rest upon paper merely, but machines for the same purpose had been in practical use for twenty years. They were of practical utility *without* the patented invention. In the case at bar, the record shows that *none* of the prior patented devices had either gone into use or were fitted for practical use; so that in a commercial sense Ritty & Birch were not only pioneers to the extent of their *improvement*, but the actual creators of the first practical cash register as a whole.

In *Am. Valve Co.* v. *Crosby Valve Co.*, *supra*, the Richardson valve was but an improvement upon prior valves intended for the same purpose; but this court, reversing the decree of the Circuit Court for the First Circuit, found that his invention did not consist in mere change of form, but was broad enough and important enough to warrant a liberal construction of the patent. Its language upon this point applies as directly and for-

cibly to the Ritty & Birch invention—to their addition of the connecting mechanism to the old Pottin and Campbell machines—as if their invention, instead of Richardson's, had been the one before the court. It said:

> "Richardson's invention brought success to what prior inventors had essayed and partly accomplished. He used some things which had been used before, but he added just what was necessary to make the whole a practically valuable and economical apparatus. The fact that the known valves were not used, and the speedy and extensive adoption of Richardson's valve, are facts in harmony with the evidence that his valve contains just what the prior valves lack, and go to support the conclusion at which we have arrived on the question of novelty. When the ideas necessary to success are made known, and a structure embodying those ideas is given to the world, it is easy for the skillful mechanic to vary the form by mechanism which is equivalent, and is, therefore, in a case of this kind, an infringement."

Ritty & Birch added to the prior indicating mechanisms "just what was necessary to make the whole a practically valuable and economical apparatus;" in fact, what was necessary to make it a practically *useful* apparatus for cash register purposes.

The entire current of the Circuit Court decisions, with a few rare exceptions such as that in the case at bar, clearly shows that those courts have never understood this court as holding that an "improvement" invention cannot be a broad one and warrant a liberal construction of the patent. Without encumbering our brief with citations of Circuit Court cases on this point, we refer to two very recent instances, one in the opinion of Judge Coxe in *Beach* v. *Box Machine Co.*, 69 Off. Gaz., 1067, Oct. 15, 1894, and the other in the opinion of the Court of Appeals for the Second Circuit (Judges Wallace, Ship-

man and Lacombe) in *Air Brake Co.* v. *Air Brake Co.*, 69 Off. Gaz., 945, October, '94. In the former case Judge Coxe, referring to the patentee, said:

> "His was not a broad invention. His operations were confined to the improvement of a single step in the art of making paper boxes. He succeeded, and in that limited sense *is a pioneer*."

Referring then to the decision of this court in the Morley case, he proceeded to a comparison of complainant's and defendants' machines, pointing out that the differences between them were formal and not substantial, and that the corresponding devices in the two machines, no matter how much they differed in form and appearance, performed the same work in substantially the same way. Thus, as to two of such corresponding devices, after pointing out their differences in construction, he said:

> "The operation of the two is somewhat different. The Beach tucker moves on right lines, while the defendants' tucker swings for a time in the arc of a circle; but when it does its work it moves in the same way, substantially as the Beach tucker. The differences are immaterial. The defendants' mechanism performs the same labor and accomplishes the same result in substantially the same way as the complainant's mechanism. The former is the equivalent of the latter. Patents would be of little value if they can be avoided by such changes. (*Union Paper Bag Machine Co.* v. *Murphy*, 13 O. G., 366; 97 U. S., 120, 125; *Cantrell* v. *Wallick*, 35 O. G., 871; 117 U. S., 689; *Winans* v. *Denmead*, 15 How., 330; *Sargent* v. *Larned*, 2 Curt., 340).
>
> "The law does not intend that one who has taken the invention in its entirety, who has appropriated the inventor's idea and the broad principle on which the structure operates which embodies that idea, shall escape infringement because he practices the invention in a slightly different form from that shown in the patent. The law in such cases deals with substance and not with form. It tears the disguise from

the infringer and exhibits him in his true light."

In the other of the cases mentioned, Judge Shipman, delivering the opinion of the Court of Appeals, said:

> "The patentee was a pioneer in that he designed in No. 376,837 *a new way to accomplish a desired result*, but upon the same general idea which he had unsuccessfully tried to work out in the earlier patent. His later patent was the bridge, and not a mere step, which carried railroad-car builders from failure to success. It is not important now to determine the grade of its pioneership and whether it may be classed in the list of those inventions which are of the highest rank; but it was an invention created to achieve great necessities and overcome great hinderances, and was one of wide breadth. A court would not be justified in adopting a 'narrow or astute construction' which should minimize the character of the invention, leave its real scope open to trespassers, and thus 'be fatal to the grant.' The *claims* of the patent do not contract the grant to narrower limits than those which the invention as made by the patentee *actually covered*, and the claims therefore *are not limited to the precise mechanical means described in the specification* by which the supplementary piston is actuated."

Further Limitations Contended for by Defendants—The Specification of the Ritty & Birch Patent.

We have thus far considered only the limitations put upon the claim by the court below; but numerous other and further limitations were discussed by defendants at the hearing below and in their brief. The principal one of these was the contention that, under the language of the specification of the Ritty & Birch patent, its first claim must be limited to such an adjustment or timing of the parts that at each operation the shoulder of the rising rod

will contact with the supporting bar or wing, and *aid* the connecting mechanism in moving said bar.

Before considering the expression in the specification which defendants have seized upon and magnified in their effort to force such limitation upon the claim, let us consider what their contention means, and what effect its admission would have upon the Ritty & Birch invention as a practical and useful thing.

The contention is that the shoulder of the rising rod must *touch* the supporting bar in passing. We say "touch," because if it *touches* the bar it will "aid" the connecting mechanism to the extent of its pressure against the bar, be that great or small, and come within the limitation contended for; while if it does not touch the bar it is outside the claim.

In other words, under defendants' contention, any one may copy the Ritty & Birch machine to the minutest details of the shape, construction, arrangement of its parts, and yet avoid the patent by simply adjusting or timing them so that the connecting mechanism will move the supporting bar entirely out of the way of the shoulder of the rising rod.

Now, it is capable of demonstration that there is no necessity for the shoulder of the rod touching the bar as it passes above it, nor any advantage in having it do so; that, on the contrary, if it makes any difference, one way or the other, it is a disadvantage. The sole purpose for which the shoulder could touch the bar would be to press it back out of its way; but this will be done by the connecting mechanism, whether the shoulder touches the bar or not. The bar would be given precisely the same movement by such mechanism if the rods had no shoulders on them at all. The purpose of the connecting mechanism is to *insure the release* of the previously lifted

rod. This fact must be conceded, for it is clear from the record, and is agreed to by Judges Acheson, Butler and Colt. Now, if the bar is properly moved for *this* purpose by the connecting mechanism, what possible difference can it make whether the shoulder of the rising rod touches the bar or not? If it can make any difference at all, it does not affect the mode of operation or result, but merely the easy working of the parts, and in this respect it could only be a *disadvantage* for the shoulder to touch the bar. If the shoulder does not touch the bar, the tablet-rods will rise and fall in true vertical lines, with the least possible friction in their guides. The keys have simply to lift them, and the supporting bar has simply to drop them when moved from under their shoulders. But if the shoulder of the rising rod is to contact with the bar, and aid in pushing it aside against the resistance of its spring, it will manifestly tend to bind the rod in its guides and increase the friction between them, thereby adding to the load of the machine and requiring more power to be applied to the key. It will be seen from a glance at the drawings of the patent that the connecting mechanism may be readily adjusted for one operation or the other without the slightest change in its function or in its contribution to the mode of operation of the combination as a whole. Pivot the lever *m* a trifle nearer its lower end and you will get a longer throw of its upper end and transmit a greater movement to the supporting bar, so that the bar will be thrown entirely out of the path of the rising shoulder, and the latter cannot possibly touch it. Raise the pivot of the lever a trifle and you will get a shorter and slower movement of its upper end, which will permit the rising shoulder to strike the bar before the latter is moved out of its path. Raise the pivot of the lever slightly higher and the movement of its up-

per end may be decreased to such an extent that it will not move the bar out of the path of the shoulder at all, which would defeat the operation of the connecting mechanism and render it useless.

From the foregoing, assuming that under the adjustment of the parts shown in the drawings the shoulder of the rising rod *will* touch the bar, defendants' contention amounts to simply this: *Lower the pivot of the lever a sixteenth of an inch and you do away with the Ritty & Birch invention and escape the patent!*

Could anything be more unreasonable—more contrary to every principle of equity and justice?

We say that it can be demonstrated that it is utterly immaterial whether the rising shoulder touches the bar or not. It is also *proved* by the record, for Mr. Patterson testifies that in none of the *fifteen thousand* Ritty & Birch machines made by the complainant prior to his testimony was the adjustment of the parts such that the rising shoulders would touch the bar. (Record, pp. 93–94.) And the explanation of this fact is simple enough: The purpose of the connecting mechanism being to move the bar further than the shoulders can move it, and it being essential that it *shall* do so, it is much easier, in the practical manufacture of the machines, to give the bar *excess* of movement, which will carry it entirely out of the path of the shoulders, than it is to provide for such accurate adjustment that it will be given a *sufficient* movement and yet permit the rising shoulders to touch it.

The fact just stated is clear enough without any argument or proof; but it is evidenced in the record by testimony of defendants' own expert, Mr. Webster (Record, pp. 26-41). The burden of Mr. Webster's testimony was to show an inconsistency between the specification and the drawings of the Ritty & Birch patent. He claimed that if one

should build a machine from the drawings of the patent, and a second machine from the specification, the two machines would be somewhat different in their mechanical construction as well as in their mode of operation and results. (Answer 37, p. 27.) To illustrate his point he produced two models, one of which he claimed to have been built in exact accordance with the drawings of the patent—to within a hundredth of an inch of its proportions (p. 32)—and the other of which he claimed to have been built in accordance with the description in in the specification, "where the elbow of the rod is described to aid in pressing back the wing and aided by an arm, a link, a trigger and a bell-crank." (Answer 11, p. 25.) The first of the models he called the "Drawings Model," and the second the "Specification Model." On cross-examination (p. 35) it was shown that the Drawings Model, instead of being so accurate as to come within a hundredth of an inch of the proportions of the drawings of the patent, varied therefrom in some respects as much as twenty to thirty hundredths of an inch; in fact, was not built in accordance with the drawings at all. As shown by the record (p. 39), defendants' counsel thereupon, by consent of complainant's counsel, withdrew the Drawings Model from the evidence, and as it was agreed that no argument should be based upon this model, we make no further comment concerning it. But the cross-examination concerning the Specification Model, which remains in the case, disclosed the fact that this model was not built in accordance with the specification of the patent, and that instead of the shoulders aiding each other in moving the supporting bar, as claimed, the shoulders did *all* of the work and the connecting mechanism none, so that the model presented precisely the same defects as if the connecting mechanism had been omitted entirely.

And the *excuse* offered by this expert for the failure of the model to correspond with his testimony-in-chief was that "it would be difficult to so adjust the parts as that the bell-crank and the detent (shoulder of the rod) would act together on the wing and assist each other in pushing it back;" "so difficult," he says, "that it would be practically impossible"—"that no one wanting a cash register and indicator would be willing to pay for such *exactness* and perfection of workmanship as would be required to produce this result." (P. 41.)

Here is ample explanation from defendants themselves of the reasons why complainant, in its practical use of the invention, has not employed such adjustment, and the strongest possible argument against a restriction of the patent in accordance with defendants' contention.

It being clear that there is no necessity for an adjustment of the parts which will permit the rising shoulders to strike the the supporting bar; that such adjustment can serve no useful purpose; that it is difficult to attain, according to defendants' own testimony; that in the practical operation of the machine it is wholly immaterial whether the shoulders do or do not touch the bar; and, finally, that in the entire use complainant has made of the invention none of its machines have contained such adjustment—it being clear by demonstration and by proof that there is no reason under the sun for giving the machine such adjustment—let us next inquire whether there is anything in the specification of the patent which *compels* such a limitation of the claim.

It need not be argued that, under the circumstances and in view of the broad language of the claim itself, it will require such positive statements in the specification, such emphasis upon this adjustment, such clear and unequivocal evidence of an *intention* to so limit the claim, as will

absolutely estop the patentees from asking for any other construction: otherwise the court will be constrained, upon principle and authority, to so construe the claim as to make it commensurate with the actual invention which the record and the prior art show the patentees to have made.

> "While a patentee *may* so restrict his claim as to cover less than he invented, *yet such an interpretation should not be put upon it if it can fairly be construed otherwise.*"
>
> *Winans* v. *Denmead*, p. 34(

> "*The prime object in construing a patent should be to preserve to the patentee his actual invention, if this can be done consistently with the language he has himself chosen.*"
>
> *Consolidated Roller Mill Co.* v. *Coombs*, 39 Fed. Rep., p. 25, 30, Brown, J.

Defendants have seized upon one single expression in the specification—one solitary sentence, or part of a sentence—and harped upon it until one would suppose it dominated the entire specification, and absolutely controlled the claim. But this is not the way patents are to be construed. We need not cite authority to show that the entire specification and claim are to be construed as an entirety and due consideration given to every part of them. It is elementary law in the construction of all contracts, including patents

Let us, therefore, see whether a consideration of the Ritty & Birch patent as a whole necessitates such construction of the claim as will throw the invention open to the public and defeat the grant.

In the first place, the specification, after identifying the art to which the invention relates, says (Record, p. 109):

> "The arrangement of the parts and operation of

> the machine are such that *no tablet can be exhibited without its value being counted upon the registering mechanism*, and whenever any tablet is disclosed it remains so until the machine is operated to disclose a second tablet."

Its next statement is that

> "The novelty of our invention consists in the construction, *combinations* and arrangements of the various parts, as will be herewith set forth and specifically claimed."

This statement is in exact accordance with the claims of the patent, and with the actual invention of the patentees. The novelty of the invention consisted in the broad combination of the first claim, and in the narrower combinations and particular constructions and arrangements of parts set forth in the remaining claims.

The specification next proceeds to describe the casing of the machine, the operating keys and the tablet-rods and tablets. With only those elements, the operation of a key would expose its tablet, but permit it to drop out of view as soon as the key was released. The specification therefore goes on to say (Record, bottom p. 110):

> "Now, it is an important feature of our machine that after a key has been operated and its tablet exposed to view, such tablet shall remain up and exposed until another key is operated, *whereupon the first falls back out of view* and the second remains exposed, and so on, thus *always keeping in view the tablet of the key last operated*."

This is a concise statement of the mode of operation their invention was intended to bring about, and a correct statement of the mode of operation and results which it actually accomplished. When any tablet has been exposed to view by the operation of a key, it shall remain exposed until another key is operated. When such other key is operated the exposed tablet *must* drop out of

view, and to that end must of course be released with *certainty*. At *all* times the tablet of the key last operated, and none other, shall be kept in view. It shall never be possible, at any operation of the machine, to expose a tablet *without adding its value upon the registering mechism*. If one tablet is up, the operation of the next key must drop that one tablet. If two tablets are up, and the key corresponding to either one is operated, the other tablet *must* drop, "always keeping in view the tablet of the key *last operated*," and no other, so that at *no* operation of the machine "can a tablet be exhibited *without its value being counted upon the registering mechanism*."

The patentees say this mode of operation is an "important feature" of their invention, and this is the only feature of their invention—the only part of the machine—upon which they lay any stress whatever. They do not mention a single other feature of construction or operation which they say is either necessary or important. This was the essence of their invention—the result they were seeking to accomplish—and having concisely stated it as above, they next proceed to a simple description of the mechanical construction by which it is carried out in the machine which they illustrated in the drawings.

They say (Record, top p. 111), "To effect this result," and then follows a detailed description, *first*, of the supporting bar or wing, and, *next*, of the connecting mechanism, by reference to the drawings.

It would have perhaps been better, instead of plunging at once into a detailed description of the parts shown in the drawings, to have stated that, to accomplish the result previously mentioned, they employed means for holding up the lifted tablets, and means for releasing them with certainty—a supporting bar or wing for the former purpose, and a train of mechanism between said bar and

the keys for the latter. But they did say this in substance, if not in words, by what they had said and by what they proceeded to say. They had said, in the statement quoted above, that it was "an important feature" of their invention (1) that when any tablet has been exposed to view it shall remain exposed until another key is operated, and (2) that when such other key is operated the first tablet shall be released and drop out of view and the second remain exposed.

Now, to accomplish the *first* of these results, the supporting bar or wing alone was necessary, so they proceeded first to a mechanical description of such bar as shown in the drawings. To accomplish the *second* result the connecting mechanism was necessary, and they therefore proceeded next to a description of such mechanism by reference to the drawing.

Again, it would perhaps have been better had they prefaced their description of the specific mechanical construction shown in the drawings by a statement that their invention was not limited to such specific construction, as is a common practice at the present day; but this court had said that such statements were unnecessary and superfluous; that

> "Patentees some times add to their claims an express declaration to the effect that the claim extends to the thing patented, however its form or proportions may be varied. *But this is not necessary. The law so interprets the claim without the addition of these words.* The exclusive right to the thing patented is not secured if the public are at liberty to make substantial copies of it, varying its form or proportions." (*Winans* v. *Denmead*, 343.)

The patentees therefore strictly followed the instructions of this court when they confined themselves to a

simple mechanical description of the construction shown in the drawings.

Having at the outset stated the important feature of their invention, its essential mode of operation, and the results which it was intended to accomplish, and having followed that with a detailed description of the construction shown in the drawings, the patentees next proceeded with a brief description of the mechanical operation of the parts *as shown in the drawings*, and as described immediately before. It is in this statement that defendants find the expression which they have seized upon as a drowning man does a straw. It reads as follows (Record, p. 111):

> "Now, the operation of this much of the machine is as follows: When any key is pressed down its rod and tablet are raised, and the elbow *d* of the rod, in rising, aids in pressing back the wing I; but to aid the elbow the arm J on the right, which, as before explained, is drawn forward whenever the key is pressed, imparts motion to the link *p* and trigger *m*, whose upper end, acting on the nose *l* of the follower *j*, presses it back, and with it the bell-crank L, which is thus forced against the wing and presses it back. Now, the parts are so arranged that when the lower side of the elbow *d* is just above the top edge of the wing the key has completed its downward stroke, and is arrested by the front bar N of the case, the trigger *m* has passed beyond the nose *l* of the bell-crank, so that the latter swings back out of the way, and the spring *a'* draws the wing forward under the elbow *d*, so the latter rests upon the upper edge, as seen at *b*, Figs. 1 and 2, and there remains, thus retaining the tablet and rod of the operated key elevated. Now, upon releasing the key it falls backward to its normal position by gravity, and is aided by the spring *g*, Fig. 2, which returns the bar K and arms J. The follower *j*, being free to swing forward without moving the bell-crank, permits the

trigger *m* to flip it up and pass under its nose to normal position."

Now this is no doubt an accurate description of the exact operation which the solicitor who prepared the application for the patent found in the particular model which he had before him. It is also probably the operation of the parts under the proportions and adjustment shown in the drawings which he prepared from the model, but in the patent the reduced size of the drawings makes it difficult to determine this fact with accuracy, and there is a difference of opinion about it among the experts. But it will be noted that the solicitor did not lay any emphasis on this aiding operation of the shoulders; that he did not give or suggest *any reason for it;* that he did not say that it was in any way necessary or essential to the operation, or that it was even advantageous or desirable; *and that he did not mention it in the claim.* He simply described the operation as he found it in the model before him, and there he stopped; just as he described the specific mechanical construction he found in the model, and stopped; as he was warranted in doing under the language of this court above quoted.

There is no more reason, upon principle or authority, for restricting the claim to the specific adjustment or timing of the operation of the parts mentioned in the specification than there is for restricting it to the particular mechanical form or arrangement of any one or another of the elements. Defendants might with equal reason have fixed upon any other part of the description and contended that the claim must be limited to that specific description.

Thus the specification says the keys are hung upon "a rod or shaft D *supported by and aiding to connect* the sides B of the frame." Defendants might just as well contend

that their machine does not infringe, because its keys are not hung upon a shaft "supported by and aiding to connect the sides of the frame"—that the claim in suit, which includes the keys as an element, must be restricted to this particular method of supporting the keys.

Again, the specification says the keys are made heavier in rear of their pivots so as to return to position by gravity, without the use of springs. Might it not as well be said that the claim must be limited to this description of the keys?

The specification says that, owing to the size of the finger buttons upon the front ends of the keys, "it would make the machine unnecessarily wide to arrange the whole series side by side in one bank; so we have arranged them in two banks, one above the other." Would there not be much more warrant for restricting the claim to this arrangement of the keys, which *is* advantageous, and for which the specification gives a good reason? And yet who would have the temerity to contend that the patent could be evaded by arranging the keys in a single row, side by side? Defendants have not—though perhaps it is only because the keys in their machine are arranged in like manner.

Again, the patent shows and describes the keys as widened at their rear ends and slotted to embrace vertical guide pins, and gives a reason for such arrangement. Why not engraft *this* description upon the claim, and say it may be evaded by guiding the rear ends of the keys in some other manner?

The specification says each tablet-rod "is *bent* to form a knuckle or shoulder *d* upon its rear side." Why not limit the claim to rods having shoulders formed by *bending*? Both the rods and the shoulders are mentioned in the claim, while the "aiding" operation in question is

not. It is of course evident that a shoulder fastened upon the rod serves the same purpose, and is the same thing in substance, but the specification *describes* the shoulders as formed by bending.

The specification and the *claim* say the tablets are *carried by the tablet-rods*. Judge Acheson found this was not essential, and that the claim was infringed by the Philadelphia machine, in which the indicating-numbers were painted on a fixed plate, and the rods carried screens movable up and down in front of them, to alternately expose and hide them. What a gross violation of the rule of construction contended for by defendant!

The patent shows and describes the tablet-rods arranged in a single straight row, and their tablets bent out of line with the rods so as to overlap each other and form a compact arrangement of the rods. Who would say that any one who was satisfied with a *less* compact arrangement of them might appropriate the invention and escape the patent by placing the rods further apart, and not bending their tablets out of line?

And so we might go on through the patent and pick out a dozen parts of the description which defendants might with equal reason insist upon having read into the claim — every one of them given more importance and emphasis in the specification than is the "aiding" operation upon which defendants have hung their hope of escaping the patent.

There probably has never been a patent granted which did not contain some description of mechanical construction or operation which, if read into the claim, would ruin it. Indeed, if defendants' contention could be maintained, it would be necessary, in drawing the specification of a patent, to add to the description of each element or part a statement that "we have described this element as

shown in the drawings, but we do not wish our claim limited in any manner by such description."

How absurd! How contrary to the holding of this court in *Winans* v. *Denmead!* But we need not go back to that case for our authority. In the very recent case of *Hoyt* v. *Horne*, 145 U. S., 302, in which this court reversed Judge Colt upon the question of infringement, the patented invention related to an improvement in rag engines, and its salient feature, both as described in the specification *and as set forth in the claim*, was the circulation of the pulp in vertical planes, above and below a horizontal partition within the vat or tank of the machine. In defendants' machine the same result was accomplished by circulating the pulp in horizontal planes around a vertical partition, but this court found that the essential *mode of operation* of complainant's machine was embodied in defendants' machine, and that the latter was simply an ingenious variation in form from complainant's; and consequently held it to infringe the patent. Speaking by Mr. Justice Brown, it said:

> "The circulation of the material around the roll in vertical planes is the salient feature of the Hoyt invention, and its utility is shown in its general adoption by paper makers.
>
> "The main question in the case is that of infringement. . . . It is insisted by defendant in this connection that there is no infringement of the first claim of the Hoyt patent, since the pulp is not circulated 'in vertical planes,' nor is it delivered by the beater-roll 'into the upper section of the vat,' as specified in that claim. Literally it is not. A technical reading of the specification undoubtedly required that the mid-feather should run horizontally instead of vertically; but the object of this was that the pulp should be received and delivered by the beater-roll along its entire length, viz., across the entire width of the tub, and this is accomplished in

the same way in both devices. In both engines the beater-roll revolves toward the top of the dam or back-fall, and a similar acceleration of speed is obtained. How the pulp shall circulate at the other end of the tub is a matter of small consequence so long as it shall circulate in vertical planes at the point where it comes in contact with the roll.

"An additional function is claimed for the Horne device in the fact that the pulp, falling as it descends the dam from a vertical to a horizontal plane in a kind of torsional current, is more thoroughly mixed than in the Hoyt device, where the pulp continues to flow in parallel lines from the time it is delivered by the beater-roll to the time it is received by it again. This may be true, and defendant's engine may be in this particular an improvement upon the other: *but he has none the less succeeded in appropriating all that was of value in the Hoyt device*, viz.: the beater-roll at the end of the tub, extending across its entire width, and the circulation of the pulp in vertical planes at the only point where such circulation is of value. The substitution of a vertical for a horizontal mid-feather at the inoperative end of the tub *is merely the use of an old and well-known mechanical equivalent, and obviously intended to evade the wording of the claims of the Hoyt patent.* *Winans* v. *Denmead*, 15 How., 330."

In finding infringement in the above case, the court simply applied and enforced the doctrine of *Winans* v. *Denmead*, making the mode of operation or *principle* of the invention—instead of form, arrangement and *appearance*—the test of infringement in comparing complainant's and defendant's machines. It merely followed *Machine Co.* v. *Murphy* in directing its attention "to such portion of the device *as really does the work*, so as not to give undue importance to other parts of the same which are only used as a convenient mode of constructing the entire device."

Applying the same doctrines to the case at bar, defend-

ants' contention for a limitation of the claim to an "aiding" operation of the shoulders is fully answered. The essential purpose of the shoulders being to support the rods upon the bar, and the essential purpose of the connecting mechanism being to move the bar to release them, it is, in the language of the court in *Hoyt* v. *Horne*, "of little consequence" what else the shoulders may or may not do.

The same contention was pressed upon Judges Acheson and Butler by the defendant in the Philadelphia case. They did not expressly pass upon the point, because they found that in the defendant's machine the shoulders upon the rising rods did, as a matter of fact, touch the bar; but Judge Acheson referred to it in his opinion in language which does not leave one in doubt as to what their views were. He said:

> "But, again, it is earnestly contended by the defendants' counsel that the first claim of the patent must be restricted to such adjustment of the parts that the shoulders of the rising tablet-rod and the L-bar of the connecting mechanism shall both bear against the wing I, simultaneously, and thus assist each other by their joint action at the same time in pushing the wing backward. *But assuredly such adjustment is not expressed in the claim, nor in the remotest manner suggested.*"

As was said by the Court of Appeals in the Air Brake case, *supra:*

> "The *claims* of the patent do not contract the grant to narrower limits than those which the invention as made by the patentee *actually covered*, and the claims therefore are not limited to the precise mechanical means described in the specification by which the supplemental piston is actuated."

Another clause in the Ritty & Birch specification which defendants have laid considerable stress upon as support-

ing their contention for a limitation of the claim to the "aiding" operation is that found on page 110 of the record, as follows:

> "The upper portion of each rod, just above the upper bar G, is bent to form a knuckle or shoulder, *d*, upon its rear side, which has beveled or inclined operating faces, for a purpose to be presently explained."

Defendants contend that this sentence must be read to mean, not that the rods *are provided with the shoulders* "for a purpose to be presently explained," but that the shoulders *have beveled or inclined operating faces* "for a purpose," etc. If the point could be material, in any event, the punctuation of the sentence does not favor the latter construction any more than the former. But it is not material. The solicitor may have intended just what defendants contend he did, but that is no reason for limiting the claim. We have seen that in the model from which he prepared the specification the shoulders probably *did* aid the connecting mechanism in moving the wing, and that he described it precisely as he found it. But we have also seen that the "aiding" operation is immaterial, that no emphasis is laid upon it, no reason given for it, and no reference made to it in the claim.

Moreover, if the "aiding" operation *were* important the beveling of the shoulders could not be essential to such operation, for it is evident that they would co-operate with the wing just as well, even for *that* purpose, if they were *not* beveled; in fact, there would be less friction between them and the wing if less of their surfaces could bear against it.

Again, the clause referred to says each shoulder has beveled or inclined operating faces—that *both* of its faces are beveled or inclined; but the specification does not sug-

gest any purpose for beveling the *under* side of the shoulder, nor has defendant suggested any. The fact of the matter is that the beveling or inclining of the upper and lower sides of the shoulders was merely incidental to the formation of the shoulders by *heading* the rods. The shoulders could not well be formed in that manner *without* leaving both their upper and lower sides somewhat inclined to the vertical line of the rod. It was a mere incident of construction, and the solicitor described it as he found it, just as he did all other parts of the machine.

But laying aside all questions upon this point, the fact still remains that, for whatever purpose the shoulders may have been so shown and described in the patent, *the shoulders of defendants' rods are beveled in the same manner, and will serve the same purpose.*

In support of their contention for the limitation of the claim which we have been discussing, defendants, in the Circuit Court, relied principally upon the decision of this court in *Snow* v. *Railway Co.*, 121 U. S., 617.

In *Snow* v. *Railway Co.* the patented invention was a steam bell-ringer for locomotives, in the construction of which the piston and piston-rod were detached from each other, and the question was whether or not the patent was infringed by defendant's device in which the piston and rod were *not* detached from each other. The patentee had not only shown and described the piston and its rod as detached, but had explained the purpose and importance of detaching them as one of the means for accomplishing the stated *object* of his invention. His claim did not specifically mention their detachment, but covered a combination in which the piston and rod were included as separate elements by letters of reference.

Upon this state of facts the court, speaking by Mr. Justice Matthews, said:

> "The question of infringement turns upon the construction to be given the first claim of the patent sued on, to determine which *it is necessary to consider the state of the art* at the time of its date."

On the face of the patent, therefore, notwithstanding the character of the specification and the importance laid upon the separation of the piston and its rod, the court was not prepared to restrict the claim to such construction unless the prior art required it; and it proceeded to a consideration of the prior art and found that the same patentee had a prior patent for a similar device in which the piston was *not* detached from its rod. It thereupon came to the conclusion, not from the language of the patent alone, but from that, *taken in connection with the prior art*, that the claim should be restricted to a combination in which the piston and rod were detached.

In the case at bar there is nothing in the prior art *requiring* the limitation asked for by defendant, and nothing upon which such a limitation *can be predicated*.

In the court below defendants urged *Snow* v. *Railway Co.* in support of their contended limitation of the claim to a *pivoted* supporting bar, as well as to the "aiding" operation of the rods and connecting mechanism; but, from the language used in their own brief below, it has no application to our case. They said:

> "It is well settled law that where a particular construction of one element of the claim is set forth *and emphasized* in the specification," the claim must be limited to such construction.

In the case at bar the specification lays no emphasis upon any of the points in question, and there is nothing

in the patent to indicate that the patentees attached any special importance to them.

We do not believe the court will find *Snow* v. *Railway Co.* a pertinent authority upon our case; nor do we believe, in view of its holdings in *Hoyt* v. *Horne* and other subsequent cases, that it will be inclined to extend the alleged doctrine which defendants claim to be deducible from it.

Moreover, this and other cases urged to the same point have been the subject of recent discussion by the Court of Appeals for the First Circuit, in the very important and earnestly contested case of *Reece Button-Hole Machine Co.* v. *Globe Button-Hole Machine Co.*, 61 Fed. Rep., 958, in which case Judge Putnam, delivering the opinion of the court, reversing the decree of the Circuit Court, said he would simply put *Winans* v. *Denmead*, and its recent reaffirmance in *Electric Co.* v. *La Rue* and *Hoyt* v. *Horne*, against *all* of them.

Defendants' Authorities Upon Restriction of the Claim.

The defendants below cited numerous authorities in alleged support of their contention for a narrow construction of the claim in suit, and will doubtless do so in this court. We shall not attempt to collate or discuss the endless number of cases for and against liberal constructions of patent claims, but content ourselves, for reply to defendants' citations, with the language of Mr. Justice Brown in *Roller Mill Co.* v. *Coombs*, 39 Fed. Rep., 25, 30, where the authorities *pro* and *con* were reviewed and discussed, and the following conclusion reached:

> "When we find a court using language which indicates that the patentee should be strictly limited

to his claim, and to the restrictions and the provisos he has inserted therein, we shall generally find that the invention is only a trifling deviation from or improvement upon what has gone before. When, upon the other hand, the case shows the doctrine of mechanical equivalents to be vigorously asserted and liberally applied, it will usually appear that the patent is a pioneer, or a marked improvement upon any device which has previously existed. The prime object in construing a patent should be to preserve to the patentee his actual invention, if this can be done consistently with the language he has himself chosen. Occasionally it will happen that the patentee will, by inadvertence or mistake, claim less than he is entitled to, and the courts be powerless to help him, but their disposition is and should be to deal liberally with those who have made valuable contributions to the natural sciences. . . .

"If, upon the one hand, the state of the art shows the invention to have been a narrow one, a strict interpretation will be given the claims. . . . If, upon the other hand, the patentee has taken a decided step in advance of the state of the art at the time his application was filed, the courts will then, if possible, construe the language of his claim so as to give him the full benefit of his improvement."

Such consideration as this, in view of the actual invention which the record shows the patentees to have made, is all the appellant asks for the patent in suit.

Defendants' Expert Testimony.

We have not thus far devoted any consideration to defendants' experts' testimony, and we shall be quite satisfied if the court will examine it and compare it with that of complainant's experts; but we desire to call attention to the summary which defendants' principal expert, Mr. Shepard, gives of the claim in suit at pages 46 and 47 of

the record, and his cross-examination at pages 55 and 56. He says (Record, p. 46):

> "In brief, the mechanism referred to in the first claim may be said to consist of the combination of a series of keys, a series of rods, each provided with a shouldered wedge, the bodies of the rods being arranged in a single lateral row and with a row of rearwardly-projecting wedges; a series of tablets connected to said row of rods and arranged in several lateral rows; an oscillating pivoted wing with its upper edge pressed against all the rods in the series by a spring, its upper edge being a simple straight-edged device which moves transversely to said row of rods to engage and disengage the shoulders of the several wedges; and two sets of connecting mechanisms, whereby upon depressing any one of the keys the wing is moved backwardly by the conjoint action of an individual wedge acting with a wedging action, and another device which acts to push the wing directly backwards without such wedging action, whereby said wing will hold up and let fall the tablets last raised and the ones that were previously up, respectively."

In his amplification of this summary of the claim his testimony is to the effect that any one may copy the Ritty & Birch machine in every particular part, and escape the patent, provided they make the shoulders of the rods abrupt instead of wedge-shaped; or if they arrange the tablet-rods in two rows instead of one; or if they arrange the rods in a single row, and do not bend the tablets out of line with the rods; or if they use any other sort of a supporting bar than a pivoted wing; or if, using a pivoted wing, they stick a pin in the frame to limit its forward movement and prevent its resting directly against the rear side of the rods when in normal position—a stop to hold it a sixteenth or a thirty-second of an inch away from the rods; or if, using such a pivoted wing, and allowing it to rest against the rods, they cut away the portions of its

upper edge opposite the spaces between the rods, so that it will have notches and projecting fingers to co-operate with the shoulders, instead of "a plain straight edge;" or if, instead of employing the "two sets of connecting mechanisms" which he refers to, they so adjust the parts that the rising shoulders do not touch the wing, and hence employ only *one* of such mechanisms.

His "two mechanisms" consist, first, of the train of mechanism which we have discussed, and which Judges Colt, Acheson and Butler have found to be the "connecting mechanism" of the claim; and, second, the rear ends of the key-levers, the lower ends of the tablet-rods and the shoulders on the rods. (Record, p. 55.) Notwithstanding the key-levers and tablet-rods and shoulders are specifically enumerated in the claim as separate elements thereof, *in addition* to the "connecting mechanism," he construes the claim to include two connecting mechanisms, of which the keys, rods and their shoulders form one! This absurd position is fully brought out in cross-examination at pp. 55 and 56, and the character of the whole testimony of the witness illustrated.

The Litigation on the Campbell Patent.

We have referred to the litigation on the Campbell patent, and the opinion of the Court of Appeals for the Third Circuit upon the same has been printed in the Appendix to our brief. The third claim of the patent, which was the one involved in both the Boston and the Philadelphia litigations, so closely resembles in character the first claim of the Ritty & Birch patent, the prior state of the art was so nearly the same in relation to both inventions, and Judge Colt considered both claims in so much the same way, that the opinion of the Court of Appeals upon

the Campbell claim is the most pertinent authority which can be found upon the construction to be given the Ritty & Birch claim.

The Campbell invention related to the automatic cash-drawer mechanism of the machine, and consisted in a certain novel combination by means of which when any key of the machine was operated, to indicate and register its value, it would also operate the lock of the drawer and release the latter, and permit a spring to throw it open, thus opening the drawer automatically, or incidentally to the ordinary operation of any one of the keys.

As will be seen by Judge Colt's opinion (Record, pp. 219, 220), the claim covered a certain combination of elements, one of which was the connection or connecting mechanism between the keys and the lock or holder of the drawer, by which the operation of a key would release the drawer; just as the Ritty & Birch claim covered a combination of elements of which one was the connecting mechanism between the keys and tablet-supporting bar, by which the operation of any key would move said bar to release the exposed tablet.

In both cases the combination, including the connection between the keys and drawer lock in the one case, and between the keys and the supporting bar in the other, was broadly new. In both cases complainant's position was that the claim should be treated as a new combination of old elements, of which the connection or connecting mechanism, *as a whole*, was one; in both cases neither complainant nor defendant employed in its machines the specific form of connection shown in the patent; in both cases the specification of the patent simply described the mechanism shown in the drawings, without suggesting any modifications; in both cases the element in question was broadly expressed in the claim, in the one case as the "connecting

mechanism," and in the other as a "mediate connection;" in both cases the question upon infringement was whether the claim was infringed by a machine employing a different form of connecting mechanism; in both cases Judge Colt held that it was not, and that the claim must be restricted to the specific form of mechanism; and in both cases he gave the same reasons for so restricting the claim.

We quote from his opinion, at page 220 of the record, as follows:

> "The same question presents itself in this suit as in the first, namely: How broad a construction should the court give to the Campbell patent? The registering apparatus was old, the opening of a drawer by means of a spring was old; but the connecting mechanism between a cash-register and a spring drawer was new with Campbell. If the defendants' machine contains this connecting mechanism, or what may fairly be considered its equivalent, the complainants are entitled to a decree, but if the connecting mechanism which is made an element of the claim sued upon is radically different in the defendants' machine, I cannot say that a case of infringement has been made out.
>
> "A comparison between the two machines in connection with the record in the case shows that the defendants use a very different connecting mechanism, and one which does not embody the patented device, unless the patent be held to cover all forms of connecting devices known at the time, and I can find no warrant for giving the patent such a liberal construction."

From the foregoing it will be seen that in this case, as in the Ritty & Birch case, he entirely ignored the new *combination*, the new *mode of operation* and the new *result* produced by the invention, and sought for its novelty in the individual elements of the combination, to wit,

in the connecting mechanism between the keys and drawer lock.

It will also be seen that, although the *combination* was broadly new and had never before existed in any manner, shape or form, yet it was *in view of the prior art* that he restricted the claim to specific details, and could "find no warrant for giving a patent such a liberal construction" as to cover either mechanical equivalents, or *known substitutes*, of the connecting mechanism which formed one element of the combination.

As heretofore stated, Judges Acheson and Butler felt bound by the rule of comity to follow Judge Colt's holding, and did not enter into the merits of the case (Appendix, p. x); but when the case reached the Court of Appeals, that tribunal being unembarrassed by the rule of comity proceeded to a consideration of the case *de novo* upon its merits. It found that the Campbell invention was broadly new, that it consisted of a new combination of old elements, of which the connecting mechanism, as a whole, was one; and that the claim was infringed by any machine which employed the same combination, and had the same mode of operation, and produced the same results, whether the form of the connecting mechanism between the keys and drawer lock was the same as that shown and described in the patent or not.

The entire opinion of the court is directed to the very point in controversy here, and we cannot well quote extracts from it without omitting much that is equally pertinent to the issue. Referring, therefore, to the full text of the opinion found in the Appendix (pp. xix to xx), we add below the portion of it relating to Judge Colt's decision in the case at bar. The court said:

> "The court whose decree is the subject of this appeal expressed no independent opinion, but merely

followed the decision of the Circuit Court for the District of Massachusetts, in a suit in which the same claim had been in controversy. (*National Cash Register Company* v. *Boston Cash Indicator and Recorder Company*, 45 Fed. Rep., 481-485). The course pursued in this regard was in conformity with the rule, well established in this Circuit, to follow, unless under extraordinary circumstances, a prior judgment of any other of the Circuit Courts of the United States, wherever the patent, the question and the evidence are the same in both suits. We do not question the propriety of this practice, as it has heretofore prevailed; but it cannot be extended to this court. The decisions of the several Circuit Courts, whenever pertinent, will be attentively considered by this tribunal; but because they are subject to appeal, and for other manifest reasons, it is not admissible for a court of review to accord them controlling effect. Accordingly, we have in this instance carefully examined the opinion of the learned Circuit Judge of the First Circuit; but, though regarding it with sincere respect, we find ourselves unable to concur in it. This claim, as we read it, is *distinctly*, *exclusively* and *broadly* for a new *combination*, and we know of no authority or principle of law which, so reading it, would warrant us in converting it by construction into a claim for detail merely.

. . . . . .

"But little need be added with especial reference to the matter of infringement. In *National Cash Register Co.* v. *Boston Cash Indicator Co.* (*supra*), it was held that the mechanism specifically designated in the third claim was old, but that the mechanism of mediate connection, which was not designated, was new; and that there was no infringement of the patent, because the defendants used a connecting mechanism which differed from that used by the plaintiffs. As we, however, have been constrained to view this claim as for a combination, the question of infringement must, necessarily, be considered by us as related to a subject quite distinct from that to which the same question was directed in the decision of the case to which we have referred. The correct

inquiry, from our point of view, is not whether these appellees use, in their mechanism of mediate connection, the same devices which are used by the appellants, or equivalents thereof, but whether the mediate connection employed by the appellees is not *itself* an equivalent of the mediate connection of the Campbell combination. It may be conceded that there are marked differences in the details by which this connection is made, and its purpose accomplished, in the one apparatus and in the other; but the manifestly well-founded expert testimony is that 'a mediate connection,' not the details thereof, is included amongst the elements of the Campbell machine. This element, as well as all others of the patented invention, are found in the appellees' apparatus."

Conclusion.

All that appellant asks is a *fair* and *reasonable* construction of the patent. It does not seek any expansion of the claim beyond the fair import of its terms. It asks that the patent be considered with a disposition to give protection to the actual invention which the patentees made—with a disposition to give the grant an effective, rather than a destructive, construction. In short, it asks no more than that the patent be considered and construed in the manner in which this court has always considered and construed patents for useful and meritorious inventions.

It is not contended that the invention was one of the few great ones of the century—that it belongs to those of highest rank—nor is there any need for such contention. The arts to which the sewing machine, the telegraph, the telephone, and other such inventions belong have a wider field of usefulness than that which includes this invention; but *in its art*—in the art of cash registers—the Ritty & Birch invention was the connecting link between failure and success—the *bridge* over which the

art passed from the old and worthless mechanisms to the successful cash register of to-day. It was a decided step in advance of what had gone before, and it was the *final* step necessary to success.

The devices prior to the Ritty & Birch invention never went into practical use at all, while a great industry has been built up on this invention. The record shows that up to the time the testimony in the case was closed the appellant company had made and sold upwards of fifteen thousand of the Ritty & Birch machines. The record can of course give us no later information, but the fact is that up to the present time the appellant has made and sold upwards of sixty thousand of those machines, of an aggregate value exceeding nine millions of dollars.

If in any class of cases the practical utility and commercial success of the invention are to be considered in construing the patent, this case certainly falls within that class.

We therefore respectfully submit that the first claim of the patent in suit should be construed as for a new and useful combination of old elements, having a new mode of operation and accomplishing new or improved results, and be held to cover and protect that combination and that mode of operation, without regard to the specific form of the individual elements; and that the decree of the Circuit Court should be reversed, with directions to award the complainant an injunction for the remainder of the life of the patent. The bill does not pray for any account of profits and damages.

EDWARD RECTOR.
LYSANDER HILL.

CHICAGO, December 10th, 1894.

Judge Acheson's Opinion on Ritty & Birch Patent.

THE NATIONAL CASH REGISTER COMPANY } In Equity.
vs.
THE AMERICAN CASH REGISTER COMPANY. } Two Cases.

(Circuit Court, E. D. Pennsylvania, June 2, 1891.)

Peck & Rector and *Lysander Hill*, for complainant.

Ernest Howard Hunter and *John R. Bennett*, for respondent.

ACHESON, J.:

These two cases are between the same parties, and were heard together. One of them is a suit for the infringement of letters patent No. 271,363, granted January 30, 1883, to James Ritty and John Birch, for improvements in cash registers and indicators. The other suit is for the infringement of letters patent No. 253,506, granted February 14, 1882, to Michael Campbell, for an improvement in the like apparatus.

The Ritty & Birch invention relates to cash registers and indicators designed for the use of storekeepers and others, as a means of accurately registering the cash receipts for any given period of time, and for indicating to the customers that the amounts paid have been registered. The machine described in the patent is provided with a series of numbered keys, each of which may be independently operated; a series of indicators bearing numbers corresponding to those on the keys, one of which indicators is brought into view whenever its appropriate key is pressed; an apparatus by which the values of the keys are registered, and a bell sounded to attract the attention of the customer and bystanders. The keys are

levers pivoted on a horizontal shaft in the lower part of the machine, and on the rear end of each rests a vertical rod working in guides, so as to freely rise and fall. The upper end of each of these rods carries a tablet bearing a number answering to that on the button of its key. The tablets are normally out of sight, but upon the depression of any key the rear end of the key-lever rises, and, lifting the vertical rod which rests upon it, exposes to view the tablet it carries. As a means of holding the indicator up after its key has been released, each tablet-rod is provided with a shoulder, and across the machine, in position to engage the under side of these shoulders, is a supporting-bar (designated in the patent "wing I"), which is pivoted at each end, and is thus free to vibrate. Its upper edge inclines toward the tablet-rods and is yieldingly held against them by a spring, so that when any rod is lifted its shoulder may press back the edge of the bar until it passes above it; whereupon the bar is moved forward by its spring into the path of the shoulder, and the latter drops back and rests upon the bar when the key is released.

Everything thus far described had existed in some form or other in machines of this class before the date of the Ritty & Birch invention. The novel contrivance devised by them consists in a "connecting mechanism," which is operated by any one of the series of keys, and moves the supporting-bar (the wing I) independently of the shoulder on the tablet-rods. This mechanism is of this nature: Underneath the front ends of the key-levers and held up against them is a cross-bar, K, having at either end an arm, J, by which it is pivoted and may have a rising and falling motion. One of these arms connects with a link extending rearwardly and attached to a trigger or lever, *m*. Above this lever is an L-shaped bar pivoted at the upper

end of its vertical arm and having the end of its lateral arm bearing against the upper front edge of the supporting-bar, or wing I. A trip ("follower *j*") is so pivoted and suspended that it extends below the elbow of the L-shaped bar, resting against a shoulder thereon, while against the lower projecting end of the trip the lever *m* bears. These parts are so related that upon the depression of any key of the series the cross-bar K is also depressed and the arm J is moved, producing a vibration of the lever *m* and movement of the L bar against the wing I, causing the latter to swing back far enough to easily allow the shoulder on any tablet-rod to pass it. When the wing I has been moved sufficiently for this purpose, the end of the lever *m* slips off the trip, permitting the L bar to drop back and the wing I (under the action of its spring) to swing in toward the tablet-rods in time to catch underneath the shoulder of the tablet-rod then being lifted. On the release of the actuating key the cross-bar K returns to its former position and swings the lever *m* back into place ready for another operation.

The defendant is charged with the infringement of the first claim of the patent, which is as follows:

> "1. In a registering and indicating machine, the combination with a series of indicating-tablets operated by a series of keys, of a series of rods, each provided with a detent or shoulder, and carrying one of the aforesaid tablets, and a supporting-wing with connecting mechanism, whereby upon operating any one of the keys the wing is so moved as to permit the passage of the rod, and whereby upon the release of the key the wing engages with and holds up the tablet-rod and tablet, substantially as described."

The evidence satisfies us that this combination was absolutely new, and that it gives to the machine increased efficiency, and, indeed, a new capability, completely reme-

dying serious defects. It is highly important when a key is operated and its rod and tablet are elevated that any tablet-rod already up and resting by its shoulder upon the supporting bar shall be released, so that its tablet may disappear. But in actual practice with the old machines operated by a separate mechanism for each key of a series, it was found that the shoulder of the rising tablet-rod frequently failed to move the supporting bar sufficiently to effect the liberation of the tablet-rods already up, by reason of a lack of perfect adjustment of the parts, the wear of the same or the clogging by dirt. This difficulty was effectually overcome by the Ritty & Birch invention, which interposed a train of mechanism, common to the whole series of keys, between them and the supporting bar, so that whenever any key is depressed the connecting mechanism is set in motion, and thereby the supporting bar is moved so far back as to insure the disengagement and fall of any tablet-rod whose shoulder may be resting upon it. It must be conceded that, previously, means had been employed, namely, a series of pivoted latches, or levers, one for each tablet-rod, cooperating with the shoulders of the rods to move the supporting bar further away than could be done by the shoulders themselves; but it is also true that Ritty & Birch were the first to accomplish this result with entire certainty of operation, and by means altogether different, both as respects construction and mode of operation, from the old devices, thus perfecting the machine in this regard.

Again, we think the evidence shows that Ritty & Birch achieved also an important new result; certainly one which before had never been accomplished in any practical way. As we have seen, the connecting mechanism of the patent takes power directly from any key of the series, and

moves the supporting bar, the wing I, independently and regardless of any actuation of it by the shouldered tablet-rods. Now the supporting bar is thus moved even by the operation of a key whose tablet-rod is already up, with its shoulder above and resting upon the supporting bar. But, plainly, without the connecting mechanism this could not be done. This new capability is of great practical benefit. For example, in the absence of the connecting mechanism, if two tablets are up in indication of the amount of a prior sale and the next sale should happen to be for the same amount, or for the larger of the two sums, the operator may strike the key corresponding to the smaller sum and sound the alarm, but register only the value of that key. But in the supposed instance the Ritty & Birch device would compel honest registry, for by the pressure of the key of the one tablet-rod the other becomes disengaged and falls certainly.

The defendant's machine is a cash register and indicator of the same general character as that set forth in the Ritty & Birch patent, and embodies substantially all the old elements or parts above described. Its tablets, indeed, are not carried directly by the shouldered rods, but are stationary, while the rods carry screens to alternately hide and expose them; the difference consisting in moving a screen at the top of the rod to bring an underlying tablet into view instead of moving the tablet itself into view by its attachment to the rod. While the defendant's counsel directed our attention to this difference between the indicating devices, we did not understand them as seriously contending that it was a substantial distinction. Prior to the date of the invention in question, these two arrangements were well-known substitutes for each other in indicating mechanisms, and we regard the difference as formal and immaterial.

The upholding instrumentality in the defendant's machine is a transverse bar proximate to the tablet-rods, with an inclined side facing them. The ends of this bar work in guides, and the bar is movable from and toward the row of rods, the latter movement being effected by a spring at either end of the bar. At the lower rear part is a cross-bar with which each key lever, by means of a pendent arm, is so connected that by the depression of any key the cross-bar will be lifted, and will fall when the key is released. At each end of the cross-bar, and adapted to rise and fall with it, is a vertically sliding bar having at its upper end a nose or lateral projection which engages a trip on a bell-crank lever. Whenever a key is operated and the cross-bar and the vertically sliding bar are thereby lifted, the nose on the upper end of the latter strikes the trip, and the bell-crank lever is thrown with such effect as to move the rod-supporting bar so far away as to release any tablet-rods whose shoulders are resting upon it. When the nose on the vertical bar has slipped past the trip, the bell-crank lever is released, and the rod-supporting bar returns into position to engage the shoulder of the rising rod. When the operated key is released the cross-bar, with its vertical bar, falls with the descent of the key lever.

From what has been said it is apparent that the defendant's machine is provided with a connecting mechanism, interposed between the keys and the rod-supporting bar, common to all the keys of the series, so that it may be operated by any one of them, and whether the tablet-rod of that particular key is up or down; that the action of this connecting mechanism is entirely independent of the action of the shoulders on the tablet-rods, and so moves the supporting bar as to insure the fall of any tablet-rods whose shoulders may be resting thereon; and that it auto-

matically disconnects itself before the full movement of the key lever is completed, so that the supporting bar is returned by its spring in time to catch the shoulder of the lifted rod.

It is, however, alleged that the defendant does not use the "wing I" of the patent. But this is true only in the sense that the specific form of that device therein shown is not employed. The first claim of the patent, however, does not call for any specific construction of this element of the combination, but for "a supporting wing." In fact, the defendant's transverse supporting bar performs the same function in the combination as the supporting wing of the patent, and its mode of operation is substantially the same. For the intended purpose the two devices are essentially the same thing.

But, again, it is earnestly contended by the defendant's counsel that the first claim of the patent must be restricted to such an adjustment of the parts that the shoulder of the rising tablet-rod and the L bar of the connecting mechanism shall both bear against the wing I simultaneously, and thus assist each other by their joint action at the same time in pushing the wing backward. But, assuredly, such a limitation is not expressed in the claim, nor in the remotest manner suggested. To import it into the claim the counsel invoke the following clause of the specification:

> "When any key is pressed down its rod and tablet are raised, and the elbow (shoulder) *d* of the rod, in rising, aids in pressing back the wing I; but to aid the elbow the arm J imparts motion to the link *p* and trigger *m*, whose upper end, acting on the nose *l* of the follower *j*, presses it back, and with it the bell crank L, which is thus forced against the wing and presses it back."

The plaintiff's expert states, what is undoubtedly the

truth, that in the very nature of the described devices the simultaneous action of the shoulder of the rod and the connecting mechanism upon the wing I for any appreciable length of time is impossible. Both, however, at one time or another, take part in pressing back the wing I, and this is the fair meaning of the specification. In that sense the shoulders on the rods and the connecting mechanism in the defendant's machine aid each other. Their exact action is shown to be this: The shoulder of the rising rod strikes and begins to move the supporting bar; then the connecting mechanism acts upon the bar, moving it out of contact with the shoulder; at this instant of time the previously upheld tablet-rod is liberated; then the supporting-bar returns, while the shoulder is still opposite its upper part, so that it strikes the shoulder and is held outwardly and slightly moved backwardly thereby, until the shoulder escapes it. Now the essential thing to be accomplished is the certain liberation of the upheld tablet-rods and the return of the supporting bar to its normal position in time to engage the shoulder of the tablet-rod then being lifted, and this is effected by the defendant's connecting mechanism. In principle, the two mechanisms are identical. And not only in mode of operation, but in purpose and effect they are alike. Whatever differences exist are of a formal character, involving changes within the range of ordinary mechanical ability. As, then, in the defendant's machine this connecting mechanism is found working in combination with all the other constituents of the first claim of the patent, all performing their respective functions and by their cooperation producing the contemplated results, we must hold that the charge of infringement is sustained.

The counsel for the defendant have pressed upon our attention the decision of Judge Colt, in the case of the

National Cash Register Co. v. *Boston Cash Indicator and Recorder Co.*, 45 Fed. Rep., 481, which was a suit on this patent, and in which the bill was dismissed, the court adjudging that the Boston company's "plate and connecting devices" were not the equivalents of the wing with the connecting mechanism described in the Ritty & Birch patent. Now were we dealing with the same mechanism, we would unhesitatingly conform our decision to that of Judge Colt, agreeably to our settled practice to follow the decision of a court of another circuit upon the same question in a suit upon the same patent. But a specimen of the machine of the Boston company has been exhibited to us, and upon inspection we find that there are obvious differences between it and the machine of the present defendant. We do not feel called on to make a critical comparison between the two machines, or even to particularize the points of distinction plainly observable. It is enough for us to say that, without intending to intimate a doubt as to the correctness of the decision made by the court in the First Circuit upon the case there presented, we feel bound to follow our own clear convictions on the question of infringement involved in this suit. In our apprehension the invention of Ritty & Birch was one of more than ordinary merit, and we cannot bring ourselves to the conclusion that their patent can be successfully evaded by such structural changes as the defendant has made. If it could be, then was the grant of the patent a vain thing.

In this case, then, there must be a decree in favor of the plaintiff as respects the first claim of the patent.

In the suit on the Campbell patent the defendant is charged with the infringment of the third claim thereof, namely:

> "3. In a cash-registering apparatus, a series of keys to designate certain amounts, combined with the drawer, the drawer holder D mediately connected with said keys, and the spring to throw the drawer open when released by the drawer holder, substantially as described."

This patent was also the subject of adjudication in the case of *The National Cash Register Co.* v. *Boston Cash Indicator and Recorder Co.*, *supra*, and the third claim was construed by Judge Colt, who held that the device there alleged to infringe that claim was not within its scope. Now it seems to us that in respect of the subject-matter of this claim of the Campbell patent, no such distinction exists between the device of the Boston company and the device of the present defendant as would justify a determination different from that made by Judge Colt, and, therefore, we will follow his decision.

In this case, then, a decree will be entered dismissing the bill.

Judge Butler concurs.

Judge Dallas' Opinion (Circuit Court of Appeals) on Campbell Patent.

THE NATIONAL CASH REGISTER COMPANY
vs. In Equity.
THE AMERICAN CASH REGISTER COMPANY.

(Circuit Court of Appeals, Third Circuit. December 23, 1892.)

Appeal from the Circuit Court of the United States for the Eastern District of Pennsylvania.

In Equity. Bill by the National Cash Register Company, Michael Campbell and Maria G. Wellbrock against the American Cash Register Company for infringement of a patent. The Circuit Court, following the decision of the Circuit Court for the District of Massachusetts in *National Cash Register Co.* v. *Boston Cash Indicator and Recorder Co.*, 45 Fed. Rep., 481, held that there was no infringement, and dismissed the bill. Complainants appealed. Reversed.

Edward Rector and *Lysander Hill*, for appellants.

Ernest Howard Hunter and *John R. Bennett*, for appellee.

Before DALLAS, Circuit Judge, and WALES and BUFFINGTON, District Judges.

DALLAS, Circuit Judge:

This is an appeal from a decree dismissing a bill for alleged infringement of patent No. 253,506, for an improvement in cash-registering apparatus, granted to Michael Campbell, and dated February 14, 1882. The only claim involved is:

> "3. In a cash-registering apparatus, a series of keys to designate certain amounts, combined with the drawer, the drawer-holder, D, mediately con-

nected with said keys, and the spring to throw the drawer open when released by the drawer-holder, substantially as described."

The defenses are that this claim is invalid; and that, even if valid, it is not infringed. It is insisted that it discloses no patentable invention whatever; but that, if it should be sustained, and as for a combination, the appellees' machine would not be an infringement, because it not only does not contain any of the specific devices of the appellants' apparatus, but, also, does not employ the combination alleged. The appellants, on the other hand, admit that all the specific devices were old, singly and in other combinations, but assert that what Campbell invented and claimed is a combination, and nothing else. Accordingly their counsel contends that the claim in question is valid, as disclosing a patentable invention of a new and useful combination; and that the appellees' machine is an infringement, not because of any real or supposed identity or equivalence of elements, but because it accomplished the same result as is accomplished by the Campbell machine, by substantially the same mode of operation. We have, then, no issue as to novelty or infringement of details, and, therefore, the only questions to be considered are: *First*. Is the claim for a combination, supported by invention? *Second*. Has the appellee infringed?

1. The claim is, in terms, for mechanism "combined with" other mechanism. It is true that certain particular mechanism is mentioned, but it does not necessarily result that the patentee intended to limit the claim to any special devices, or that the law will so restrict it. The question is one of construction; and, as we are of the opinion, upon grounds to be hereafter stated, that Campbell's invention was a primary one, it follows that the

language of this claim should be as liberally interpreted as its fair import will allow, to the end that his conception shall be justly protected to its true extent and in its broad and actual scope.

The invention, says the specification, "relates to a cash-registering apparatus to be employed in connection with a cash drawer," and the claim is for (in such apparatus) a series of keys to designate different amounts, combined with a drawer for receiving cash; a drawer-holder, for holding the drawer closed against the tension of the spring (presently mentioned); a mediate connection (of some kind not designated) between the series of keys and the drawer-holder, by which the latter will be disengaged from the drawer upon the operation of any of the keys; and a spring to throw the drawer open when so disengaged. By this contrivance, the cash drawer, which, when closed, is always locked, is, by the operation of any one of the keys of the series, thrown open by the spring; and none of the devices by which this object is accomplished, so far as they are designated in the third claim, were new. The series of keys, the cash drawer and the spring were unquestionably old; and the drawer-holder is but a pivot lever, differing from other levers of the same class in nothing but in form, and in the use to which the patentee applied it. Of any particular mechanism of mediate connection nothing need be said at this point; none is specifically mentioned in the claim with which alone we are concerned, and, for the present purpose, it may be taken for granted that none which was new was contemplated. It is clear, then, that so to construe this claim as to confine it to specific details would be to invalidate it for lack of novelty; a consequence which certainly ought not to be accepted, when, according to the natural and ordinary meaning of its language, it plainly appears to be a claim

for a new combination of old devices—a well-known series of keys combined with the other familiar mechanism mentioned, and mediately connected, in some way—not mentioned—with the drawer-holder included in that mechanism. It cannot be restricted to all or any of the devices used in the mediate connection between the series of keys and the drawer-holder, not only because they are not even specified in the third claim, but also because they are expressly claimed in the second claim, which is:

> "2. In a cash-registering apparatus, a series of keys to designate certain amounts, a pawl-carrying bar, *c*, and a series of toggle-levers, *x*, intermediate between each key and the said pawl-carrying bar, the toggle-lever *h*, actuated by the bar *c*, combined with the drawer-holder D and drawer C, substantially as described."

There is nothing upon this record which would warrant us in attributing to the patentee the folly of having presented, and to the Patent Office the improvidence of having allowed, two claims for the same thing. The distinction between them must be maintained, that both may be given effect.

The court, whose decree is the subject of this appeal, expressed no independent opinion, but merely followed the decision of the Circuit Court for the District of Massachusetts, in a suit in which the same claim had been in controversy (*National Cash Register Company* v. *Boston Cash Indicator and Recorder Company*, 45 Fed. Rep., 481–485). The course pursued in this regard was in conformity with the rule, well established in this Circuit, to follow, unless under extraordinary circumstances, a prior judgment of any other of the Circuit Courts of the United States, wherever the patent, the question and the evidence are the same in both suits. We do not question the propriety of this practice, as it has heretofore prevailed; but

it cannot be extended to this court. The decisions of the several Circuit Courts, whenever pertinent, will be attentively considered by this tribunal; but because they are subject to appeal, and for other manifest reasons, it is not admissible for a court of review to accord them controlling effect. Accordingly, we have in this instance carefully examined the opinion of the learned Circuit Judge of the First Circuit; but, though regarding it with sincere respect, we find ourselves unable to concur in it. This claim, as we read it, is distinctly, exclusively and broadly for a new combination, and we know of no authority or principle of law which, so reading it, would warrant us in converting it by construction into a claim for detail merely.

Thus far we have assumed that the actual invention was of a new and useful combination, and also (perhaps without necessity) that it was a primary one. We will now state the reasons by which these assumptions are supported. Whether or not the "connecting mechanism" between the drawer-holder and the keys was new with Campbell, is, in our opinion, apart from the question. That mechanism, or any part of it, was not, as we have shown, covered by the claim in controversy. The complainants' bill was not founded upon it, and this court is not called upon to deal with it, but solely with an alleged combination, which it is asserted, but denied, was invented by Campbell. Directing our investigation, therefore, to this distinct issue, we have, upon full examination of the proofs, become entirely satisfied that Campbell was, in fact, the original and first inventor of the combination claimed in his third claim. It is unnecessary to refer in detail to the several exhibits which were introduced to show the prior state of the art, or to enter upon a discussion of the testimony. It is enough to say that, upon all the evidence,

we do not doubt that Campbell was the first person who combined a series of keys with any other mechanism whatever, so as to attain the object which he proposed and accomplished. It nowhere appears that a combination of a series of keys with a drawer-holder and other mechanism had ever before been conceived by means whereof each key of the series, when and as operated, would, or could, unlock a drawer in a cash-registering apparatus, and permit a spring to open it. This Campbell effected, not by new mechanism, but by a new combination; and in doing this, he made a patentable invention.

We have not overlooked the suggestion of appellees' counsel, that Campbell's conception and arrangement were merely of an aggregation of known elements, not amounting to a true combination; and that, therefore, he was not entitled to a patent for anything. This suggestion is based upon the allegation that each of the elements associated by Campbell does not qualify every other of them; but this is true only in the sense that each does not modify or change the characteristic mode of action, or method of operation, of the others. In doing its appointed share towards effecting the single result achieved by the co-operation of all, each element acts, of course, according to the law of its own being; but though of necessity so acting, it is still, none the less, combined with the others, and does "qualify" each and all of them (not their distinctive methods of operation) in the sense that each is, by the co-operation of the others, capacitated to contribute, by acting in its own peculiar way, to the common end; which, without the co-operation of each and every other of the co-ordinated elements, it would be powerless to accomplish or advance. Some of the language used by Mr. Justice Matthews in delivering the opinion of the Supreme Court in the case of *Pickering* v. *McCullough*, 104 U. S.,

310, has been pressed upon our attention, as indicating, it is claimed, that in a patentable combination of old elements all the constituents must so enter into it that each changes the mode of action of every other, and that each element must not merely perform its own part in the combination, but must also, in some way, be directly and immediately concerned in the performance of their respective parts by every other of the elements. No such doctrine as is thus claimed to be deducible from the opinion in *Pickering* v. *McCullough* appears to have been essential to the judgment in that case; nor do we think it necessary to attribute to the particular language referred to (104 U. S., 318) the meaning ascribed to it by counsel. If, instead of an extract, the whole opinion be read, in connection with the authorities which are cited in it, it may be readily perceived that the substance of the doctrine intended to be affirmed is that a combination, to be patentable, must produce a new and useful result, as the product of the combination, and not a mere aggregate of several results, each the complete result of one of the combined elements—there must be a new result produced by their union. That Campbells' invention was of a combination as thus defined, we entertain no doubt; and that Mr. Justice Matthews should be understood as holding that no combination is patentable which does not fulfill the requirement which appellees' counsel insists is requisite, we cannot suppose. If it were essential to a valid patent for any combination whatever that the mode of action of every element included in the combination should be changed by each of the others, it would have been impossible to sustain several combination patents which have in fact been upheld, as, indeed, it would be difficult to conceive of any mechanical combination which would be both possible and patentable. A screw *or* a

lever *can* act only in one way; yet a screw *and* lever may so act in combination as to produce, in consequence of their combination, a single new and useful result. Moreover, there is no intimation in the opinion in *Pickering* v. *McCullough* of a purpose to overrule the earlier decisions with which (upon the view taken of it by counsel) it would appear to conflict; nor has it, in later cases (which, of course, are to be followed), prevented the Supreme Court from declaring the law of this subject in accordance with our understanding of it.*

Campbell's invention was a primary one. The proofs abundantly establish that he was the first person who succeeded in effecting, in any manner or form whatever, the opening of an automatically locked cash drawer, in a cash-registering apparatus, upon the operation of any one or other of the keys of its series. In doing this he did not merely improve upon something which had been done before. What he produced was absolutely and entirely new. The result which he achieved was a distinct and single one, which had not, by any means, been previously attained. He entered upon barren territory in the domain of invention, and was the first to occupy and appropriate it. He was a pioneer.†

That Campbell's invention was useful, we are also fully persuaded. The evidence of this is so complete as not to require detailed discussion. Indeed, the ocular proof of its practical utility, manifested by the operation of the apparatus in our presence, would, of itself, be sufficient

---

**Blake* v. *Robertson*, 94 U. S., 728; *Parks* v. *Booth*, 102 U. S., 96; *Loom Co.* v. *Higgins*, 105 U. S., 580; *Clough* v. *Barker*, 106 U. S., 166; *Railway* v. *Brake Shoe Co.*, 110 U. S., 229; *Yale Lock Co.* v. *Sargent*, 117 U. S., 536.

† *Morely Machine Co.* v. *Lancaster*, 129 U. S., 263, 273.

to require us to conclude that it does not lack this essential of patentability.

Second. But little need be added with especial reference to the matter of infringement. In *National Cash Register Co.* v. *Boston Cash Indicator Co.* (*supra*) it was held that the mechanism specifically designated in the third claim was old, but that the mechanism of mediate connection, which was not designated, was new; and that there was no infringement of the patent, because the defendants used a connecting mechanism which differed from that used by the plaintiffs. As we, however, have been constrained to view this claim as for a combination, the question of infringement must, necessarily, be considered by us as related to a subject quite distinct from that to which the same question was directed in the decision of the case to which we have referred. The correct inquiry, from our point of view, is not whether these appellees use, in their mechanism of mediate connection, the same devices which are used by the appellants, or equivalents thereof, but whether the mediate connection employed by the appellees is not itself an equivalent of the mediate connection of the Campbell combination. It may be conceded that there are marked differences in the details by which this connection is made, and its purpose accomplished, in the one apparatus and in the other; but the manifestly well founded expert testimony is that "a mediate connection," not the details thereof, is included amongst the elements of the Campbell machine. This element, as well as all others of the patented invention, are found in the appellees' apparatus. We attach no importance to the fact that in the appellants' machine the drawer is released upon downward pressure of the key, whilst in that of the appellee it is released as the finger leaves the key to which the pressure is applied. In both, the drawer

is opened by what is substantially one and the same act—the operation of a key of the series. Though some of the corresponding parts of the machinery are not the same, and, separately considered, could not be regarded as identical or conflicting, yet, having the same purpose in the combination, and effecting that purpose in substantially the same manner, they are the equivalents of each other in that regard*. We are of opinion that the combination here claimed is infringed by the apparatus used by the appellees.

The decree of the Circuit Court is reversed, with costs.

And it is ordered that this cause be and the same is hereby remanded to the said Circuit Court for further proceedings to be there taken in pursuance of this determination and judgment of this court, and in conformity with this opinion.

---

* *Cochrane* v. *Deener*, 94 U. S., 780.

INDEX.

	Page
Statement of the case	1
Summary of brief	2
The general construction of Cash Registers	4
The statement of invention in the patent in suit	5
Authorities showing the effect of a "statement of invention."	5
Description of Ritty and Birch machine in the patent in suit	7
Complainant's description contrasted with that of the patent	12
Authorities that a patent cannot cover a construction never contemplated by the patentee	13
Complainant contradicts the clear description of the patent	13
Authorities showing that a clear description prevails over inaccurate drawings	14
The claim of the patent in suit makes the "supporting wing" an essential element	16
Authorities to the effect that claims must be construed according to their terms	18
Authorities to the effect that claims are limited by the clear statements of the specification	20
Complainant's perversion of the claim in issue	23
Authorities on interpretation of patents by expert testimony.	25
The claim in issue interpreted by its result and by the specification	26
Complainant's Perversion contrasted with the claim as it stands.	30
THE STATE OF THE ART.	
(1.) The Pottin patent	32
Diagram of indicating mechanism	34
(2.) The Campbell patent	36
Diagram of indicating mechanism	38
(3.) The Pottin and Campbell patents show operative machines	39
Authorities that patents showing operative devices (though never marketed), are part of the state of the art	40
(4.) The Windmüller and Ahrens patent	41
(5.) The Hardy patent	43
Diagram of indicating mechanism	44
Summary of the state of the art	45
The patent in suit is not a "pioneer" patent	47
Authorities defining a "pioneer" patent	47
Construction of defendants' machine.	49
Comparison of defendants' machine with plaintiff's patent and the prior art	51
Distinctions between an oscillating wing and a sliding bar	54

PAGE

Plaintiff's theory of a "single connecting mechanism" . . . 57
"Connecting mechanism" was old and operated like that of Ritty and Birch 59
Diagram of Ritty and Birch's two trains of "connecting mechanism" 61
(1.) Patent to Windmüller and Ahrens 62
Diagram of their "connecting mechanism" . . . 63
Patent to Howie 64
Patent to Capron 64
Patents to Pottin, Campbell and Hardy 64
(2.) The Typewriter patents:
Patent to Deming 66
Diagram of "connecting mechanism" of Deming patent 66
Patent to Sholes and Glidden 67
Patent to Allen 67
(3.) The patents for adding machines:
Patent to Plumb 67
Patent to Forrester 67
Patent to Borland and Hoffman 67
(4.) The Campbell patent 68
The several trains of "connecting mechanism" in defendants' machine 69
Diagram of defendants' "connecting mechanism" . . . 70
The alleged feature of "disconnection" is not new with Ritty and Birch 72
Summary of argument as to "connecting mechanism" . . . 73

Complainant's erroneous theory of the law of this case . . 75
Authorities upon "Double Use" 77
Authorities upon "Aggregation" 80
A pretended new result of the patent in suit, first suggested at the argument 82
Authorities showing that the Court will not notice such an afterthought 83
Diagram of first example of individual connection . . . 86
Diagram of second example of individual connection . . 87

Supposed demand for complainant's machine 88
Authorities showing that evidence of extensive sales is often inconclusive, even on the question of utility 89

The decisions on the Ritty and Birch patent briefly considered. 92
Conclusion 95

Supreme Court of the United States.

OCTOBER TERM, 1894.

No. 155.

THE NATIONAL CASH REGISTER COMPANY,
Complainant, Appellant,
vs.
THE BOSTON CASH INDICATOR AND RECORDER COMPANY AND JAMES H. WRIGHT,
President, Defendants, Appellees.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF MASSACHUSETTS.

BRIEF FOR DEFENDANTS, APPELLEES.

Statement of the Case.

This suit was brought by bill in equity alleging infringement by defendants of Letters Patent to James Ritty and John Birch, No. 271,363, dated January 30, 1883, for a Cash Register and Indicator. The first claim only of the patent is in issue. The defence to the action is that defendants' machine is not an infringement, because it does not contain the features which the patentees have fully described and specifically claimed as constituting the novelty of their invention, to which features, moreover, the patent is necessarily limited in view of the state of the art.

The evidence consists almost entirely of expert depositions with regard to the various patents in evidence and the question of infringement. The deposition of Mr. See and the two depositions of Mr. H. B. Renwick set forth complainant's view on this subject, while the two depositions of Mr. Shepard

express defendants' position. Mr. Shepard gave a second deposition by leave of Court, because complainant in rebuttal so changed its position from its *prima facie* proofs that it became necessary for defendants to take further evidence.

On the question which stands at the threshold of the case, — namely, the fair interpretation of the patent, — the Court will hardly need any testimony on either side, for the invention is simple and the patentees' language is clear.

The case was fully argued before Judge Colt, Circuit Justice of the First Circuit, who held in a careful opinion (Rec., p. 215) that the bill must be dismissed, because the machine of the patent in suit was only an improvement upon prior cash registers of the same class, and the defendants in their machine did not use the mechanism of the claim in issue, or its equivalent.

We submit, with confidence, that this decision was correct.

The opinion also considered another suit between the same parties, upon the Campbell patent, which was argued at the same time; but complainant's appeal from the decree dismissing the bill upon this patent (No. 156 on the docket of this court) was recently voluntarily dismissed by the complainant, appellant.

Short Summary of Defendant's Brief.

Pages 4–15. We show that the patented machine is of the same class as several prior machines attaining the same result; and that the patent itself describes the invention as consisting in certain details of mechanism, especially an oscillating "supporting wing" which is pushed backward by elbows on the tablet rods, and by an auxiliary actuating mechanism to aid the elbows.

Pages 16–22. The first claim is for a combination of four elements, and the result of the combination is fully set forth by the claim. One of these elements is the "supporting wing," which defendant does not use.

Pages 23–31. Complainants' interpretation of the claim completely perverts its language, both by reading the supporting wing out of the claim, and also by so interpreting the words "connecting mechanism" as to deprive the combination claimed of elements necessary to effect the result set forth in the claim (namely, the pivot and actuating spring of the wing), and to add to the combination elements admittedly unnecessary to effect that result, and not intended by the patentee to be part of the claim (namely, the train of auxiliary actuating mechanism which "aids" the rods to push back the wing).

Pages 32–49. The Pottin, Campbell, Windmüller & Ahrens and Hardy patents effect the entire result of Ritty and Birch, and Pottin and Campbell effect it by the same combination of mechanism as is set forth in Claim 1, except for the supporting wing.

Pages 49–57. Defendant's machine has no supporting wing, but has the old sliding bar of Pottin and Campbell, and does not operate according to the description of the Ritty and Birch patent.

Pages 57–69. A "single connecting mechanism," leading from a series of keys to a device to be actuated by any one of the keys, was an old and familiar expedient, and is shown in numerous prior patents.

Pages 69–82. The "connecting mechanism" of the Ritty and Birch machine (as the same is understood by complainant) operates precisely as such mechanism had done in numerous prior patents, and effects no new result in the patentee's machine; and there is nothing patentable in the use of this old mechanism, operating in its old manner, to accomplish the old result of giving the proper movement to the supporting device.

Pages 82–88. A pretended "new result" of the patent in suit finds no support in the record; and the result is not, as a matter of fact, either novel or due to the use of "connecting mechanism."

Pages 88–92. There is no proof of the popularity or utility of the Ritty and Birch invention.

Pages 92–95. Consideration of the decisions on this patent.

The General Construction of Cash Registers and Indicators.

Automatic registers had been commonly known for a great many years before the patent in suit. They are exhibited in the numerous patents for "registers" or "adding machines," and consist essentially in a series of keys with their forward ends projecting outside a case. Each end bears a number, and upon the actuation of any key, a registering mechanism within the case records a corresponding number; the amount registered at the end of a day or other period will represent the total sum of the numbers so recorded.

It is obvious, however, that such a machine would be of little value in ascertaining the honesty of a clerk (which is the design of the class of machines here in controversy): as the clerk might depress a key for a less amount than that actually received, thereby registering a correspondingly less amount, and pocket the balance.

Accordingly, as is very well said by complainant's expert, Mr. See (Int. 5, p. 11): —

> "In the cash register system, the customer is made an element of the detective system. When the customer pays money to the clerk — say fifty cents — the clerk operates the machine accordingly, to add fifty cents to the total receipts. Such operation of the machine exposes a tablet reading fifty cents, and at the same time rings a bell to call the attention of the purchaser to the tablet. . . . The presumption is that the customer has sufficient interest in the transaction to object to having paid more money than the circumstances would indicate as being called for."

Machines of this class are known by the full name of "cash registers and indicators," as the Ritty and Birch patent denominates the machine; it is not denied that such ma-

chines were known before the patent in suit. In the most common form (as shown in the Pottin and Campbell patents, hereinafter fully described), they consisted of a series of keys, a registering mechanism within the case, and a series of rods bearing tablets, each tablet having a number corresponding to that of its key. The operation of such machines is, that, upon the depression of any key, the amount indicated by that key is registered by the mechanism within the case; and at the same time a tablet is lifted to the view of the customer bearing the same number, and a bell is rung to call his attention to the same. The tablet remains exposed until the actuation of another key and elevation of another tablet, when the previously raised tablet is removed, so as to prevent confusion and mistake.

The Ritty and Birch patent here in suit is only an improvement in a well-known class of machines for attaining a certain result; and, in fact, it purports to be nothing more, as we shall now proceed to show.

The Statement of Invention in the Ritty and Birch Patent.

It is customary in modern patents to begin with a general statement of the invention, referring to the prior art, and stating wherein the invention essentially consists; this opening statement being followed by a detailed description of the mechanism. This "statement of invention" is often of great importance in determining what the patent sets forth as the invention, especially in view of the nebulous and uncertain language which is often used in claims. Where a patentee expressly states that his invention consists in mechanical modifications of prior machines attaining the same result, he cannot, with consistency, thereafter claim to be a "pioneer." He is bound by his own deliberate definition of the invention.

In *Wollensak* vs. *Sargent*, 151 U. S. 221, 225, the patentee stated in his "statement of invention" that the invention consisted" in providing a proper support, or support

and guide, for the upper end of the lifting rod." This Court held that, in view of this statement, other elements could not be imported into the claims.

So in *Electric Gas Lighting Co.* vs. *Fuller*, 59 Fed. Rep. 1003, 1004, the Circuit Court of Appeals for the First Circuit held that the patent in suit "must be limited to mere mechanical details," and said, as a chief reason for this conclusion: —

> "This view is confirmed by the fact that Tirrell's specifications state that his invention 'consists in certain details of construction hereinafter more fully set forth and pointed out in the claims.'"

See, also, to the same effect, *Schuyler Electric Co.* vs. *Electric Engineering Co.*, 62 Fed. Rep. 588 (COXE, J.).

The "statement of invention" in the Ritty and Birch patent is as follows (Rec., p. 109): —

> "Our invention relates to *an improvement* in cash registers and indicators designed for the use of storekeepers and others, as a means of accurately registering the total cash receipts for any given period of time — as a day, for instance, — and for indicating to the customers that the amount paid has been registered, by disclosing to their view such amounts upon figured tablets.
>
> "The arrangement of the parts and the operation of the machine are such that no tablet can be exhibited without its value being counted upon the registering mechanism; and whenever any tablet is disclosed it remains so until the machine is operated to disclose a second tablet."

Of the foregoing statement, Mr. Shepard says (Int. 4, p. 43), without contradiction by Mr. Renwick: —

> "This I understand to be the ordinary recital of the old and well-known class of machines existing in the prior art, upon which class of machines the patentee has attempted to make an improvement. The arrangement and operation of the parts in the last paragraph quoted, I understand to be, not those which are peculiar to this patent, but they are the arrangement of the

> parts and mode of operation which the patented machine has in common with the prior machines in the same class, and to which the invention relates."

As a matter of fact, machines operating in exactly this manner are shown in the prior patents to Pottin, Campbell, and Windmüller & Ahrens; and the result is expressly admitted to be old by complainant's expert, Mr. Renwick. (Rec., p. 69, Cross-Ints. 5–8.)

After this reference to the prior art, the patentees define their own invention as follows: —

> "The novelty of our invention consists in the construction, combinations and arrangements of the various parts, as will be hereafter set forth and specifically claimed."

Plainly, the patent itself negatives complainant's contention that the patentees were "pioneers," and "attained a new result." To this subject we shall return.

The Description of the Machine in the Ritty and Birch Patent.

After this general definition of their invention, the patentees proceed to describe the mechanism in which that invention consists. There is no suggestion throughout the specification that the invention consists in anything more than the introductory paragraph would indicate. Nor is there anywhere to be found the statement that the mechanisms may be varied without departing from the essence of the invention. No novel "mode of operation" or "new result" is anywhere suggested.

The patent describes a series of keys E, hung upon a shaft D. Each key has upon its front end, outside the case, a button bearing a number corresponding with the amount to be registered. Upon the operation of any key, the amount is registered by mechanism which is not here in controversy, and need not be described.

The remaining mechanism is that for indicating the amount of the sale to the customer, and for ringing a bell to call his attention to the indicator, these being inseparable parts in any machine of this class. Upon the rear end of each key is carried a vertical rod F, bearing upon its top a tablet H, with its appropriate number. These rods must all be in a single row, owing to the construction of the supporting mechanism hereafter described; and therefore, in order to get the tablets into a narrow space, their stems are bent backward and forward as shown in Fig. 4, so that they may overlap. The patent says of the rods: —

> "The upper portion of each rod, just above the upper bar G, is bent to form a knuckle or shoulder *d* upon its rear side, which has *beveled or inclined operating faces for a purpose to be presently explained.*" (Patent, p. 110.)

When any key is depressed, the rod is raised and the tablet appears to the customer through an opening in the upper part of the case. If this were all the mechanism, the tablet would fall out of sight again upon the release of the key by the operator; but as the patent says: —

> "It is an important feature of our machine that after a key has been operated, and its tablet exposed to view, such tablet shall remain up and exposed until another key is operated; whereupon the first falls back out of view and the second remains exposed, and so on, thus always keeping in view the tablet of the key last operated."

This is admitted to be an old result in machines of this class, as we said above.

The patentees then describe their supporting mechanism to effect this old result: —

> "To effect this result, we *pivot*, by means of trunnions or a shaft extending between the sides B, a *forwardly inclined wing* I, *pivoted at its lower edge*, as at *f*, and *resting at its upper edge against the rear sides* of the upper portions of the rods F. This wing extends back

of all the rods and is free to vibrate on its pivotal axis *f*. *It is yieldingly held against the rods by any suitable spring.*"

The "supporting wing" (which is expressly made an element of the claim here in issue) is thus very fully described as the first and principal feature of the patentees' supporting mechanism. This fact is important, because complainant seeks to construe this feature out of the claim.

The patentees next describe a double train of actuating mechanism, leading at one side of the machine to the bell, and at the other side of the machine to the supporting wing: — At each end of the machine there is pivoted upon the shaft D a flat arm J, extending upwardly and also downwardly. Between the lower ends of the arms J and beneath the front ends of the keys is supported a common bar K, which is depressed by the operation of any one of the series of keys, and thus moves forward the upper ends of the arms J.

One of these arms J is connected by a link *p* with a so-called "trigger," or pivoted lever *m*, the end of this trigger engaging a so-called "follower" *j*, whose rear edge rests upon a shoulder of a bent lever, L, hung on the same pivot; the rear end of this lever rests against the front of the oscillating wing. The opposite arm J is similarly connected by a link *q* to a similar trigger *r*, which engages with a similar follower *s* of a bell crank lever *t* for the purpose of ringing a bell. As the patent says: —

> "The opposite arm J is connected by a similar link *q* to similar tripping mechanism *r*, *s*, *t*, for operating the hammer *u* of a bell or gong M."

This double train of actuating mechanism is clearly shown by the diagram, *infra*, page 61.

Such trains of actuating mechanism between a series of keys and a bell, or other device to be actuated by any one of the keys, were (broadly speaking) very common in the art, as saving the use of a separate connection from each

key to the bell; and there is no indication in this patent that the patentees regarded the use of such a train of mechanism as anything new (apart from its specific form), or that they gained any "new result" thereby.

The specific form of the actuating mechanism is adapted to actuate an oscillating wing which swings backward from the row of rods.

The foregoing is the entire description of the indicating and bell-ringing mechanism, which consists essentially in a single row of tablet rods, with elbows having operating faces; a pivoted oscillating wing pressed by a spring against the rear of the single row of rods; and two trains of mechanism exactly similar to each other, one leading from the keys to the bell, and the other from the keys to the supporting wing.

The patentees next proceed to describe the mode of operation: —

> "Now, the operation of thus much of the machine is as follows: *When any key is pressed down, its rod and tablet are raised, and the elbow* d *of the rod, in rising, aids in pressing back the wing I; but to aid the elbow*, the arm J on the right, which, as before explained, is drawn forward whenever a key is pressed, imparts motion to the link *p* and trigger *m*, whose upper end, acting on the nose *l* of the follower *j*, presses it back, and with it *the bell crank L, which is thus forced against the wing and presses it back.* Now, the parts are so arranged that when the lower side of the elbow *d* is just above the top edge of the wing, the key has completed its downward stroke and is arrested by the front bar, N, of the case, the trigger *m* has pressed beyond the nose *l* of the bell crank, so that the latter swings back out of the way, and the spring *a'* draws the wing forward under the elbow *d*, so that the latter rests upon the upper edge, as seen at *b'*, Figs. 1 and 2, and there remains, thus retaining the tablet and rod of the operated key elevated. Now, upon releasing the key it falls backward to its normal position by gravity, and is aided by the spring *g*, Fig. 2, which returns the bar K and arms J. The follower *j*, being free to swing forward without moving the bell crank, permits the trigger *m* to

> flip it up and pass under its nose to its normal position. *During this operation the opposite arm J, Fig. 2, has in like manner actuated the hammer of the gong, which is sounded every time a key is depressed to its farthest limit*, and only then, and thus gives notice to the customer that the machine has been properly operated. Whenever the same key is successively operated, its rod and the tablet remain up and exposed to view; but when a different key is operated the tablet of the previous one is released and falls back out of sight, and the tablet of the operated key remains up and exposed."

The remainder of the specification is concerned only with the registering devices.

Whatever may be the *complainant's* theory of the operation of this machine, as required by the exigencies of its case, the mode of operation is clearly and plainly described by the *patentees*.

Each rod has a shoulder, with a beveled or inclined operating face, and the purpose of that operating face is to push backward the pivoted, oscillating, straight-edged wing, which is held forward against the rods by a spring, and moved backward by the operating face of the detent on the rod. "To aid this elbow," as the patentees say, devices are employed consisting of an arm, link, trigger and bent lever with follower, this whole train of mechanism being precisely identical with that which, at the other end of the machine, rings the bell to call the attention of the customer.

These twin actuating mechanisms are not given any name at all in the specification of the patent, but are simply described by their component parts. Nor is anything said as to their mode of operation further than as is above described, — that one aids the elbow on the rod in pushing back the wing, while the other rings the bell.

Complainant's avowed position is that the one novelty of the patented combination is the use of "a single connecting mechanism" in any form between the keys and any supporting device, and that its purpose is to "push back the wing *further* than the rods could do," and so ensure the release

of a raised tablet. Is there a word *in the patent* to justify this position? Does not the description of the moving of the wing conjointly by the elbow and the bent lever expressly contradict it?

It is useful at this point to contrast with the plain description of the patent, the position which complainant has been forced to take in this case.

1. Complainant says that the machine is a "pioneer" machine, and effects a "new result."	1. The patent says that the invention consists in an improvement over machines attaining the same result, and relates to the construction of the parts.
2. Complainant says that the patent may cover any form of supporting device, and any "connecting mechanism" for moving the same.	2. The patent describes very specifically an oscillating wing and a particular mechanism for moving the same.
3. Complainant says that the elbows do *not* aid in moving the supporting wing rearwardly, and that the great "new result" of the patent is that the train of actuating devices moves the wing *further* than the elbows on the rods could do.	3. The patent expressly says that the elbows move the wing aside and are merely *aided* therein by the actuating train, and says *nothing* as to moving the wing further than the elbows on the rods could do. In fact, it implies the contrary.
4. Complainant represents that the advantage of the invention was in surely dropping a previously raised key.	4. The patent admits that this was old (as does complainant's expert himself).
5. Complainant's position is that the great novelty of the patent is the use of "a single connecting mechanism" to actuate the supporting wing, and that the patent is not limited to any specific form of such train of mechanism.	5. The specification of the patent nowhere employs the phrase "connecting mechanism," or any similar phrase, nor is it anywhere indicated that there is any novelty in the twin trains of mechanism for moving bell and supporting wing, apart from their specific form.

We will come back to complainant's position; but the foregoing contrast is sufficiently striking.

The case is one of those where a complainant seeks, for the purpose of holding a rival manufacturer, to convert a patented invention into something which the language of the patent did not describe, and which was not in the mind of the patentees. This cannot be done, as this Court has often decided.

In *Sargent* vs. *Burgess*, 129 U. S. 19, 26, this Court held that there was no infringement, although there the defendant's structure came within the language of the claim, saying:

> "Gorham (the patentee) evidently had no idea of such a construction as that of the Williams patent, found in the defendant's washboard; and no person could, by following the description in the Glidden specification, arrive at the defendant's structure."

As has just been epigrammatically said in *Consolidated Vapor Stove Co.* vs. *Ellwood Gas Stove Co.*, 63 Fed. Rep. 698, 700:—

> "Such a reading of the clause is more ingenious than sound. As opposed to the construction now made by the [complainant's] expert, we have the significant silence of the patent on these points. *Indeed, if the gist of the invention was what is now alleged, the patentees were signally successful in not disclosing it.*"

Complainant Contradicts the Description of the Patent.

Complainant's expert, in order to carry through his contention, even goes so far as to directly contradict the description in the specification. This sets forth, it will be recalled, that the shoulders on the tablet rods have "operating faces," that these faces press back the wing, and that the bell crank lever L aids the shoulder in this work. There is no other statement in the patent about the pushing back of the supporting wing except this, and this statement is full and clear.

In complainant's *opening* case, Mr. See stated (Cross-Int. 35, p. 20) that "the parts may be adjusted to *act in unison* and perform the duty in common, the connecting mechanism aiding the detents, and the detents aiding the con-

necting mechanism"; and that this operation "is the one described in the patent." But Mr. Renwick's theory is that the lever L pushes back the wing further than the elbow would do. He is, therefore, obliged to say (page 63): —

> "I am aware that the patent states that 'the elbow *d* of the rod, in rising, aids in pressing back the wing I.' *As far as I can find out from the drawings, this statement is not exactly true*, because, so far as I can learn from them, the wing is pushed back by the connecting mechanism and not by the shoulders on the rod."

But it is preposterous for the owner of a patent to attempt to contradict an express statement in the specification of the mode of operation of the machine by reference to the drawings. As Mr. Shepard very well says (page 75): —

> "Patent Office drawings are not intended to be made with such accuracy and exactness as to overcome a positive statement in the specification. Their office is to assist in the description of the device and not to overcome it."

Mr. Shepard adds that he has carefully measured and laid out the parts of the drawings, and finds that as a matter of fact the elbow on the rod and the lever L do act together in pushing back the wing. Mr. Renwick denies this; and there is considerable testimony on both sides of this point. But we do not deem it necessary to discuss it; for it is perfectly well settled that the clear description in the specification must prevail.

We cite a few cases to this point.

In *Hogg* vs. *Emerson*, 11 How. 587, 606, this Court said, in speaking of the relation of specification and drawings, that errors in the drawings could be corrected "because after all *it is the specification which governs, and the drawings merely illustrate*."

In *Consolidated Brake Shoe Co.* vs. *Detroit Steel Co.*, 59 Fed. Rep. 902, 904, there was an error in the drawings, but the Court held the description in the specification to be sufficient, saying: —

> "It would be evident to them (ordinary mechanics) at once that the deliberate phraseology of the specification, which in substance is the inventor's own, was rather to be followed than an inaccurate drawing."

See to the same effect, —

Gunn vs. *Savage*, 30 Fed. Rep. 366, 369;
Hamilton vs. *Ives*, 6 Fish P. C. 244, 249 (affirmed in *Ives* vs. *Hamilton*, 92 U. S. 426);
Tinker vs. *Wilber Mfg. Co.*, 1 Fed. Rep. 138, 139.

Complainant's expert finds it necessary to contradict the plain description of the Ritty and Birch specification for two reasons.

First. Upon the issue of novelty, complainant's expert contends, as we have pointed out, that the important function of the Ritty and Birch "connecting mechanism" is to push back the supporting wing *further than the tablet rod could do.* The description in the patent of the co-operation of the shoulders and "connecting mechanism" interferes sadly with this theory.

Second. The projections of *defendant's* tablet rods do not move aside the supporting bar, and hence the description in the specification is an obstacle to the finding of infringement.

But, as we have said, the express language of the specification cannot be contradicted by fine spun deductions from the drawings.

Complainant further took the extraordinary course of proving by Mr. Patterson (Ints. 18–24, p. 92) that the machines made by complainant had departed from what is described in the Ritty and Birch patent in this respect and others. This shows very well the slight value of the patented construction; but we fail to see how a complainant can by such conduct enlarge the scope of his patents!

The Claim of the Ritty and Birch Patent makes the Wing an Essential Element.

The only claim put in issue by the complainant is the first claim of the patent, which reads as follows (p. 113) : —

> "In a registering and indicating machine, the combination with a series of indicating tablets operated by a series of keys, of a series of rods, each provided with a detent or shoulder and carrying one of the aforesaid tablets, and a supporting wing with connecting mechanism, whereby, upon operating any one of the keys, the wing is so moved as to permit the passage of the rod, and whereby, upon the release of the key, the wing engages with and holds up the tablet rod and tablet, substantially as described."

The meaning of this claim in connection with the specification seems perfectly plain. It sets forth as the invention the combination in a registering and indicating machine of four elements: (1) a series of keys, (2) a series of rods, each provided with a detent, (3) a series of tablets carried by the rods, and (4) a supporting wing with connecting mechanism. The combination is further defined by a full statement of its result, namely, that on operating any key, the wing is moved to permit the passage of the rod, and on the release of the key the wing engages with and holds up the tablet rod.

The claim is clearly for a combination of mechanism for *supporting* a tablet rod when raised by the key; the result of *releasing* a tablet rod is not here in question.

Both experts, Mr. Renwick for complainant, and Mr. Shepard for defendant, have testified at considerable length with regard to the meaning of this claim; but this is really a matter of law for the Court, and the meaning of the claim seems free from difficulty.

What a "wing" means is not in question. Mr. Shepard says (Rec., p. 52) : —

> "The term 'wing,' as applied to a part having a movement relatively to the part to which it is connected, and from which it projects, is understood in the arts to apply to a *hinged, pivoted or oscillating member in contradistinction to a sliding member.*"

This statement is wholly undisputed. Mr. Renwick does not claim that the term "wing" covers a sliding bar; he only says that a sliding bar is "the equivalent of the wing"; and in speaking of the prior state of the art, he contrasts (p. 66) "an oscillating wing" and "a sliding rod," so that the *meaning of the language* of the claim is free from difficulty.

The construction of the claim will be more fully considered after an exposition of the prior state of the art. This general statement may now be made. The state of the art shows, it is admitted, registering and indicating machines which combine a series of keys, a series of rods, a series of tablets and a longitudinally moving supporting bar with proper connecting mechanism, whereby the general result set forth in the claim is fully attained; that is, the supporting bar is first moved to one side to permit the passage upward of a rod, and then, on the release of the key, engages with the rod and holds it up. No patent in the prior art, however, shows in combination with the tablet rods and keys a *wing* which is moved rearward to permit the passage of the rod, and then oscillates forward to hold up the rod, as in the patent in suit. Such a wing has certain advantages in simplicity and ease of operation over a sliding bar, as we point out hereafter.

In view, therefore, of the description in the specification, which states that the invention consists not in any broad new result but in the construction of the various parts; in view of the fact that in describing the supporting mechanism the patentees fully set forth as their primary element the forwardly inclined wing vibrating on its pivotal axis and yieldingly held against the back of the rods; and in view of the

fact that the claim expressly specifies the "supporting wing" as an element of the combination,— it would seem perfectly plain what the patentees, at least, intended to set forth as their invention. If this be true, that is an end of the case, because defendants' machine uses the longitudinal sliding bar which was common in prior machines of this class, and not the supporting wing of Ritty and Birch.

Furthermore, the claim specifies that the series of rods are provided each *with a detent or shoulder;* and the only result specified is that, on operating any one of the keys, *the wing is moved to permit the passage of the rod*, and then engages with the same.

Now, it is described in the specification that the detent or shoulder upon the rods has beveled or inclined operating faces, and the operation is stated to be that the elbow, in rising, presses back the wing I.

It seems to us plain that the claim, by the language just mentioned, makes this mode of operation an essential element of the claim.

In defendants' machine, however, there is no pivoted supporting wing, and the shoulders on the rods never act to press aside the supporting bar, and complainant seeks to eliminate both of these elements from the claim, although one of them is included directly, and the other by fair implication; while both are made essential by the specification.

The cardinal principle in the construction of claims is that they must be construed according to the fair meaning of their language.

Cases on Construction of Claims According to their Terms.

In *Day* vs. *Fairhaven R. R. Co.*, 132 U. S. 98, 102, this Court (by Mr. Chief Justice Fuller), said: —

> "As the claim must be held to define what the Patent Office has determined to be the patentee's invention, it ought not to be enlarged beyond the fair interpretation of its terms."

So, also, in *Haynes* vs. *McLaughlin*, 135 U. S. 584, 596, this Court said: —

> "A claim should not be enlarged by construction beyond the fair interpretation of its terms."

So, also, in the often quoted case of *White* vs. *Dunbar*, 119 U. S. 47, 52, this Court said: —

> "The claim is a statutory requirement, prescribed for the very purpose of making the patentee define precisely what his invention is: and it is unjust to the public, as well as an evasion of the law, to construe it in a manner different from the plain import of its terms."

In *McClain* vs. *Ortmayer*, 141 U. S. 419, 424, this Court points out that the object of requiring a claim

> "is not only to secure to him [the patentee] all to which he is entitled, but to apprise the public of what is still open to them. The claim is the measure of his right to relief: and while the specification may be referred to, to limit the claim, it can never be made available to expand it. . . . If the language of the specification and claim shows clearly what he desired to secure as a monopoly, nothing can be held to be an infringement which does not fall within the terms the patentee has himself chosen to express his invention."

See, to the same effect,

Howe Machine Co. vs. *National Needle Co.*, 134 U. S. 388, 394.

Burns vs. *Meyer*, 100 U. S. 671, 672.

Merrill vs. *Yeomans*, 94 U. S. 568, 570.

In *Durand* vs. *Shulze*, 61 Fed. Rep. 819, 820, the Circuit Court of Appeals for the Third Circuit, after quoting from numerous decisions of this Court, well said: —

> "The above extracts from adjudged cases show how closely a patentee is held to his claim in describing the invention for which he has sought and obtained his patent, and exhibit a marked unanimity of judicial opinions in relation to this provision of the patent law. In the apt words of Judge Dallas, in rendering the decree of the Circuit Court, the law prescribes 'that the claim must

be taken as defining precisely what the invention covered by the patent is, and hence the true question is not what the patentee might have claimed, but what he has claimed.'"

There is no legal principle which has been more frequently and consistently applied by this Court to the decision of patent cases than that laid down in the above citations. For the attempt is constantly made, as in the case at bar, to stretch the patent in an infringement suit so that it will cover mechanism different from that described and claimed by the patentee as constituting his invention.

This rule as to not violating express language would be enforced even in the hard case where a patentee had made a broad invention but failed to patent it. But where, as in the case at bar, the machine is, at most, an improvement over other machines for obtaining the same general result, this Court has never wavered in the application of this principle.

The cases where this Court has given a patentee the benefit of a broad range of equivalents have been cases of "pioneer inventions," which are, of course, wholly inapplicable to the facts of the case at bar; and even there, as a general rule, the language of the claim or the specification pointed out that the patentee was dealing with a broadly new construction.

Cases on Limitation of Claims by the Specification.

Even if the language of the first claim of the Ritty and Birch patent were less specific, the specification would plainly limit the combination claimed to one in which the supporting device is a pivoted oscillating wing, which is pushed back by the detents on the rod. The patent expressly states that its novelty consists merely in the construction and arrangement of the parts, and fully describes the pivoted spring-held wing as being the principal element of the supporting mechanism; and expressly describes this wing as pushed back by the detents on the rods, "aided" by the auxiliary actuating mechanism.

This specific mechanism and mode of operation is all that is described by the patent, and there is no suggestion that the invention consists in anything more than the mechanism described, or that other devices could be substituted for those set forth.

The decisions of this Court as to the limiting effect of such specifications are too familiar to require prolonged discussion.

In *National Meter Co.* vs. *Yonkers*, 149 U.S. 48, 55, this Court said that, —

> "*Claim* 1 *of the original patent did not specify a piston revolving about its centre.* . . . But it does not seem doubtful that such a piston was a necessary element of Claim 1 of the original patent, and that it forms an element of every new claim of the reissue. *The only piston described in the specification of the original patent, and therefore the only one which could have been referred to in Claim* 1 *of the original patent*, is one having the side-rocking and rotating movement," etc.

In *Consolidated Roller Mill Co.* vs. *Walker*, 138 U. S. 124, 133, this Court adopted the opinion of the Circuit Court, holding that there was no infringement without the use of swivelled boxes, which were necessary to the mode of operation described in the specification. The Court said: —

> "True, those boxes are not expressly mentioned in the claim, but we think they are to be regarded as entering therein by necessary implication, for the reason just stated."

In *Joyce* vs. *Chillicothe Foundry*, 127 U. S. 557, 562, the specification stated that the weight of the pawl caused it to fall back into the next tooth below, after the ratchet bar had travelled the length of the tooth. But the claim was broadly for the pawl with two or more teeth, "and adapted to move in inclined slots, grooves or guides in the frame." The defendant's pawl was actuated by a spring. This Court held that, in view of the "plain statements" of the specification, —

> "The first claim must be limited to a pawl *moving by gravity alone* in inclined slots, grooves or guides in the frame."

So, also, in *Matthews* vs. *Ironclad Mfg. Co.*, 124 U. S. 347, the original first claim simply specified "ends *b b* soldered to the latter." But the specification stated that the caps were united "by tin joints made by soldering with pure tin," and described the advantages of such soldering. This Court held that the patent was limited to a fountain in which the caps were connected by *pure tin* solder.

In the well-known case of *Snow* vs. *Lake Shore Railway Co.*, 121 U. S. 617, 629, the specification stated that the piston was disconnected from its rod. But the claim was broadly for the combination of cylinder, piston, piston rod, slotted rod and crank. This Court held that, —

> "The language of the specification limits the first claim to a combination in which the piston and piston rod are detached from each other"; and this language is not "a mere recommendation by the patentee," because "*there is nothing in the context to indicate that the patentee contemplated any alternative* for the arrangement of the piston and piston rod."

For other cases in which this Court has limited a claim to a certain feature not therein expressly mentioned, purely on the ground that the specification makes such element material, see, —

> *Hartshorn* vs. *Saginaw Barrel Co.*, 119 U. S. 664, 679.
>
> *Sargent* vs. *Hall Safe Lock Co.*, 114 U. S. 63, 85.
>
> *Fay* vs. *Cordesman*, 109 U. S. 408, 414.

The Circuit Court of Appeals for the Second Circuit very well expressed the principle in the recent case of *Philadelphia Novelty Mfg. Co.* vs. *Weeks*, 61 Fed. Rep. 405, 408: —

> "The specification contains no suggestion that this particular arrangement of parts may be dispensed with: and where a patentee has thus carefully and specifically

> pointed out the details of his structure, which details, as he shows, discharge a stated function, it is not for the Court to declare them immaterial."

It is plain, therefore, that the first claim of the patent in suit must be limited, not only by its own express language, but by the express statements of the specification, to the construction and mode of operation there so fully set forth, in which a pivoted oscillating wing is pushed back by the detents on the rod, aided by a particular form of auxiliary mechanism, specifically devised for moving such wing.

We submit, therefore, that the language of the specification and of the claim in this case distinctly limits the patentee to his oscillating supporting wing, which is pushed rearwardly by the detents on the rods. We shall hereafter show that the state of the art enforces this necessary conclusion from the language of the patent.

Complainant's Perversion of the Ritty and Birch Claim.

As the interpretation of the first claim, according to the fair meaning of its terms and the description of the specification, would not include the defendant's machine, complainant is driven entirely to pervert and distort the language of the claim. Complainant's position is that the "supporting wing" must include within its meaning a "sliding bar"; and as the combination of the four elements of keys, rods, tablets and laterally moving supporting bar was old to effect the same result as is set forth in the claim, as complainant admits, complainant had to find some other novelty in the claim. Consequently, the insignificant words "with connecting mechanism" are selected, and it is claimed by Mr. Renwick that these words, and these alone, give novelty to the claim, and the words are interpreted as referring distinctly and only to the train of actuating mechanism between the keys and the supporting wing above described. Mr. Renwick says (page 61) that the train of mechanism "commencing with the rod

K below the key, and ending with the lever L, is, as I understand it, the connecting mechanism of the first claim."

This is very plainly a complete perversion of the language of the claim.

In combination claims, wherein a number of specific elements are set forth, such words as " with connecting mechanism," or " with actuating mechanism," and other like phrases, are frequently used; but the very purpose of employing phraseology of this sort is to avoid making the actuating or connecting mechanism an element of novelty in the claim; and such words simply indicate that the parts are appropriately connected together or actuated by some means which do not constitute an element of the invention.

Mr. Renwick's strained interpretation of the meaning of the first claim is one which was forced upon complainant by the exigencies of the case, after the prior state of the art had been put in evidence. In complainant's opening testimony, its expert, Mr. See, gave the natural interpretation to these words (Int. 6, page 14, hereafter quoted).

A *comparison of the first and fifth claims* further proves the error of Mr. Renwick's position. He makes the words " with connecting mechanism " embody *the whole novelty* of the first claim (Cross-Int. 5, p. 69) and refer distinctly to the train of actuating devices between the keys and the supporting wing. But on the other end of the machine, exactly the same train of mechanism is used between the keys and the bell; and Claim 5, which refers to this mechanism, is as follows: —

> "The combination with the bell M and trip *r*, *with connecting mechanism*, of the arms J, pivoted upon the shaft D, supported by the spring *q* and connected by the bar K, arranged beneath the keys E, substantially as described, for the purpose specified."

Plainly, the words " connecting mechanism " in this claim do not refer to the *entire* train of devices, because the bar K, arms J and trip *r* are expressly specified as elements of

the claim. "Connecting mechanism" must refer in this claim to devices connecting the trip *r* with the bell (in this case, the follower *s*, and bell crank *t*). Thus these vague words mean different things in different claims; it is, therefore, impossible to make "connecting mechanism" refer in the first claim to a definite element which constitutes the entire novelty of that claim,—as impossible as it would be to attempt a similar construction of Claim 5; and this is made even plainer by the fact that the words "connecting mechanism" do not once occur in the specification.

A defendant, in a patent suit, is under a great disadvantage in respect to terminology, for if the complainant chooses to affix a strained and unnatural meaning to some term, the defendant is obliged to follow to make the record clear. *It would never occur to any person reading the specification of the Ritty and Birch patent to describe the train of mechanism from the bar K to the actuating lever L as "connecting mechanism."*

It is not so described throughout the specification of the patent, and a more natural descriptive name for it would be either "auxiliary mechanism," because it aids the detents or rods in pushing back the wing, as set forth in the specification, — or else "wing-moving mechanism," thus describing its function. Mr. Renwick himself, in speaking of the same train of mechanism on the other side of the machine, which rings a bell, does not call it "connecting mechanism" but "*bell-ringing mechanism*" (Int. 8, p. 99). Nor is there a single instance in the prior patents in evidence showing similar trains of actuating mechanism, where such mechanism is spoken of as "connecting mechanism."

We submit, therefore, that the language of the first claim will not bear the strained and artificial interpretation given to it by complainant.

Cases on Interpretation of Patents by Expert Testimony.

On the question of the meaning of the language of this patent, this Court will not be much aided by expert testimony

on either side. There are no technical terms or complicated descriptions, as to which the Court needs help. As was said in *Loom Co.* vs. *Higgins*, 105 U. S. 580, 586, the Court will avail itself of expert testimony to understand technical terms. But the construction of the patent is purely a matter for the Court.

As was held in *Winans* vs. *N. Y. & Erie Railroad Co.*, 21 How. 88, 101 (cited and approved in *Spring Co.* vs. *Edgar*, 99 U. S. 645, 658) :—

> "Professors or mechanics cannot be received to prove to the Court or jury what is the proper or legal construction of any instrument of writing. A judge may obtain information from them, if he desire it, on matters which he does not clearly comprehend, but cannot be compelled to receive their opinions as matter of evidence."

It was therefore held that the Court below was right in refusing to receive expert testimony on the question of the construction of a patent.

See, to the same effect,—

Corning vs. *Burden*, 15 How. 252, 270.

Waterbury Brass Co. vs. *N. Y. Brass Co.*, 3 Fish. P. C. 43, 54.

Day vs. *Stellman*, 1 Fish. P. C. 487, 491.

We therefore ask the Court to interpret the plain language of the patent in suit; and we submit that the interpretation given by complainant to the first claim cannot be sustained.

The First Claim of the Patent Interpreted by its Result and by the Specification.

What, then, is the mechanism which connects the supporting wing with the rest of the machine, so that the machine may perform the result set forth in the claim?

This phrase "connecting mechanism," as we said, is not found in the specification at all; and its meaning in this first

claim must be ascertained, not from the ingenuity of experts, but from the function of the combination as defined in the claim, and from the specification of the patent itself. This is the only true rule of interpretation, and was laid down by complainant's expert, Mr. See (Int. 6, p. 14) : —

> "The term 'connecting mechanism' of the claim does not in the specification receive a direct definition. *The result set forth in the claim is a result due entirely to the combination recited in the claim, and to arrive at a definition of the term in question, I would primarily inquire into what mechanism is necessary, in addition to that nominated, in order to produce the described result.*

In the patent the wing and its connections are fully described as follows : —

> "To effect this result, we pivot, *by means of trunnions or a shaft* extending between the sides B, a forwardly inclined wing I, *pivoted at its lower edge*, as at *f*, and resting at its upper edge against the rear sides of the upper portions of the rods F. This wing extends back of all the rods, and is free to vibrate *on its pivotal axis, f*. It is *yieldingly held against the rods by any suitable spring*."

Now, in this passage, the connecting mechanism for the wing, which enables it to do its work by supporting it in position and permitting it to be moved backwards and pulling it forwards, is fully described; and there is nothing in the first claim or specification to indicate that the patentees had any other mechanism in mind in making this claim.

In the first place, there is the shaft or pivot *f* which connects the wing to the machine, and upon which the wing oscillates, so that it may be moved backward and forward in operation. Second, there is the spring which pulls the wing forward against the rods, and which *alone* causes the wing to return to place under the detent of the rod to hold it up. **Without this connecting mechanism, the result of the claim could not be attained at all, and yet the complainant reads it out from the claim altogether.**

Furthermore, this is the only connecting mechanism nec-

essary to attain the result set forth in the claim, as is admitted by Mr. See (Int. 6, p. 14) : —

> "In the Ritty and Birch device the tops of the detents of the tablet rods are beveled, so that as they rise, they themselves operate upon the supporting bar or wing and give it the proper movements at the proper times. *Viewing the patented device as thus constructed, the only 'connecting mechanism' found essential to the performance of the result is mechanism for supporting the wing or supporting bar, and for endowing it with elastic engaging motion.* In other words, bearings for the wing or supporting bar, and a spring for it."

Mr. Renwick himself testifies to the same effect. On page 60 he describes the keys, rods and tablets, and the supporting wing pivoted on the pivot *f*, and drawn under the rod by means of the spiral spring. He then says : —

> "Under this construction, if one finger piece be depressed, the corresponding rod will be lifted, the shoulder or detent on which will, as it rises, force the top of the wing I backward, and after the detent has passed the top of the wing, the latter will be drawn forward by its spring under the abrupt lower projection of the shoulder, thus holding the rod and its tablet up, and the inner end of the key will fall and the finger piece rise as soon as the finger is removed, thus leaving the tablet exposed."

Now, this is the entire result set forth in the first claim, which says, "whereby, upon operating any one of the keys, the wing is so moved as to permit the passage of the rod, and whereby, upon the release of the key, the wing engages with and holds up the tablet rod and tablet." And there is no better way of determining what is the combination claimed, than by seeing what elements are necessary to effect the result set forth in the claim.

Mr. Renwick proceeds to explain the function of the "connecting mechanism," as he interprets that term. He says that if only the detent of the rods in the Ritty and Birch machine pushed back the wing, it would be necessary to have

the rods and detents constructed with extreme accuracy to insure the dropping of a previously raised tablet rod. He then says: —

> "In order to get rid of these difficulties, the patent describes what is called in the first claim 'a connecting mechanism,' *the purpose of this mechanism being to throw the top of the wing rearward* when any one of the finger pieces is depressed *so far towards the rear of the machine that the detent on any one tablet rod that is up will have ample space to fall in* while a succeeding tablet rod is being lifted, thus rendering the operation of the machine certain."

This result was not new with this patent, but it is more important here to notice that the patent does not mention from one end to the other that what Mr. Renwick calls "the connecting mechanism" is to operate in this way. No such mode of operation is even hinted at.

And even if the function of the train of actuating mechanism were what Mr. Renwick says it is, namely, the sure dropping of a previously raised tablet (the patent says nothing about it), the first claim is not concerned with this result, but simply with that combination of mechanism whereby the tablet is raised and supported.

Mr. Renwick's interpretation absolutely violates the plain meaning of the claim, not to mention at this point the state of the art.

The supporting wing must have "connecting mechanism" in the shape of supporting shaft and actuating spring, in order that the result so fully set forth in the first claim may be obtained. As so interpreted, the elements of the claim are sufficient to accomplish the result specified.

If, on the other hand (as complainant and its expert interpret them), the words "connecting mechanism" refer to the bar K, arm J, link, trigger and lever, which push back the supporting wing, and to that "single connecting mechanism" only, the supporting wing is left without supporting shaft or actuating spring, or their equivalents, which are

absolutely necessary if the wing is to act as described in the claim, "to engage with and hold up the tablet rod"; while, on the other hand, the "single connecting mechanism" (as defined by Mr. Renwick) is absolutely unnecessary to effect the result specified in the claim, as he himself admits, and is necessary only for another purpose, namely, to push the supporting wing far back and release a previous tablet, which result is neither mentioned in the claim nor anywhere in the specification of the patent.

In short, defendants' construction gives the claim every element necessary to its described result; complainant's construction omits one necessary element and adds a series of unnecessary devices.

The claim was purposely drawn *not* to include the train of actuating mechanism, which aids the detent on the tablet rod. Supposing that in this case defendant had no single train of actuating mechanism to move the wing, but employed the detents on the shoulder to push it out of the way, how strenuously would complainant argue that the train of actuating mechanism shown in the Ritty and Birch patent was referred to *only in Claim* 4, and that Claim 1 of the patent had purposely been made broad to cover any combination of keys, rods, tablets and supporting wing, whereby the wing was first moved aside and then re-engaged the rod; and how conclusive such an argument would be!

We put in parallel columns the claim as the patentees made it and the claim as Mr. Renwick reissues it, without the formality of Patent Office action.

MR. RENWICK'S REISSUE.	PATENTEES' CLAIM.
"In a registering and indicating machine, the combination with a series of indicating tablets, operated by a series of keys, of a series of rods, each provided with a detent or shoulder and carrying one of the aforesaid tablets, *a supporting device*, and *a*	"In a registering and indicating machine, the combination with a series of indicating tablets, operated by a series of keys, of a series of rods, each provided with a detent or shoulder and carrying one of the aforesaid tablets, and *a supporting wing with*

single train of connecting mechanism between the keys and supporting device, whereby the supporting device is moved so far upon the operation of any key as to release any previously raised tablet rod."

connecting mechanism, whereby, upon operating any one of the keys, the wing is so moved *as to permit the passage of the rod*, and whereby, upon the release of the key, *the wing engages with and holds up the tablet rod and tablet*, substantially as described."

Mr. Renwick also provides that the detents on the rods shall *not* push back the wing: the description of the patent is exactly contrary.

The result specified in the claim is twofold: the wing is moved "to permit the passage of the rod," and "the wing engages with and holds up the tablet rod": this can be accomplished, without question, by the detents on the rods pushing back the wing, and the spring then drawing it forward: and this is what the patent describes. The meaning of the claim is plain.

We have not in the least exaggerated the complainant's perversion of this claim: and it seems plain, upon principles which have been laid down by this Court in many decisions, that such a twisting of the patentees' language, "like a nose of wax" for the purpose of holding a machine to be an infringement, cannot be permitted.

If the patent, at the date when this suit was brought — four years and a half after its issue — had been reissued with such a claim as Mr. Renwick now draws for the patentees, could it be claimed for a moment that such reissue claim was valid, as being for the same invention as that of the original patent?

Complainant's case ends at this point: for, concededly, there is no infringement except upon Mr. Renwick's interpretation of the claim.

We have now discussed the interpretation of the patent upon its own language, which we believe to be plain and unmistakable, and we arrive at the consideration of the prior art.

The State of the Art.

The opening statement of the patent in suit is, that the invention is an improvement in cash registers and indicators, for accurately registering the cash receipts and indicating to customers the amount registered — the operation being that "no tablet can be exhibited without its value being counted on the registering mechanism, and whenever any tablet is disclosed, it remains so until the machine is operated to disclose a second tablet."

The prior art abundantly shows that Ritty and Birch were right in confining their invention to a detailed improvement on old machines: for machines were old which had the mode of operation just described: they registered the amount of a sale, indicated the amount thereof by exposing a tablet, at the same time ringing a bell to secure the attention of the customer, and suffered the tablet to remain exposed until another tablet was elevated, when the first one disappeared.

1. *The Pottin Patent.*

The English patent to POTTIN, No. 2076, May 28, 1877 (Rec., p. 102), for "an improved cash registering apparatus," describes a series of keys, projecting outside the case, each one of which registers its appropriate amount by a registering mechanism within the case. The patent thus describes the general operation of the indicating mechanism: —

> "The stem of each key or button also bears on one end of a lever, the other end of which carries a plate or card which usually is hid behind a screen in the front side of the casing, but which, when a key or button is depressed, is caused to rise and present itself behind an opening in the screen, showing to the person dealing with the cashier the amount registered by him, the movement of the lever also causing a hammer to strike a bell" (page 103).

Two different forms of the machine are shown on the two sheets of drawings, — that of Sheet 2 being here material.

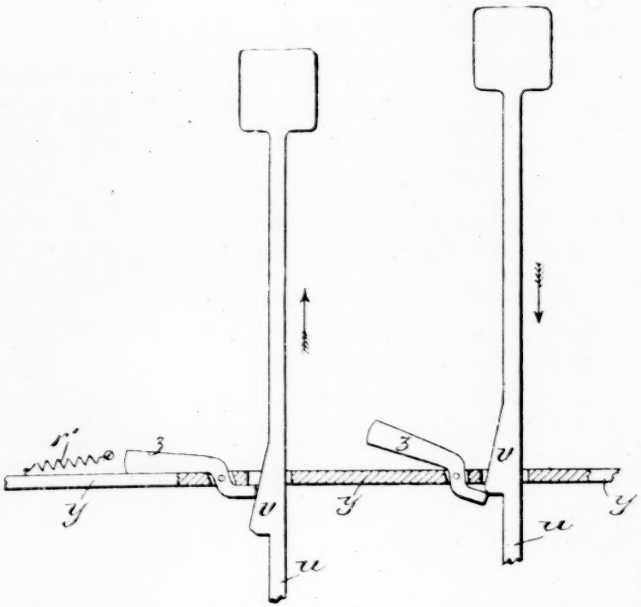
The pivoted key levers are shown at $t\,t'$, each actuating by a lever connection b, s, the tablet rods $u\,u'$ carrying the indicating cards. Each rod has a nose e, which, when the key is depressed and the rod rises, pushes to one side supporting bar y, which, immediately after the nose has risen above the bar, is pulled back into place by the spring r'. The depression of the key also registers the appropriate amount by ratchet and pawl connections, and there is, moreover, a "single connecting mechanism" between the series of keys and the bell, as shown in Fig. 1; each rod s, actuated by the key, has a branch z', which catches under a universal bar k', supported upon arms in the machine, and running over the whole bank of keys (like the bar K of plaintiff's patent), so that the actuation of any key raises the universal bar and causes the bell to be struck.

Therefore, the operation of any key registers the amount of the sale, rings a bell and indicates the amount; the sliding supporting bar is "so moved as to permit the passage of the rod, and upon the release of the key engages with and holds up the tablet rod and tablet," exactly as set forth in the first claim of the Ritty and Birch patent.

The Pottin patent, however, accomplishes not merely what is set forth in the first claim of Ritty and Birch, but also the further function of that patent (which Mr. Renwick emphasizes as the sole advantage thereof) namely, the "sure release" of a previously raised tablet. If the nose e of Pottin's rod simply engaged with its projection on the supporting bar to push it to one side, there would be the danger that a previously raised rod might not surely be released from its projection. To effect such release, Pottin employed a series of counterweighted trip levers pivoted to the supporting bar, one for each tablet rod, and arranged to be acted on by the shoulder of a rising rod to push the bar further to one side than it could be if the shoulder directly engaged its supporting projection upon the bar.

As shown in Fig. 5, the upper, weighted, horizontal portion

of the lever z rests on the upper side of the bar, while its lower horizontal projection, below its pivot, extends beneath the projection on the bar, and projects to the right beyond it. If the rod is moved only a very short distance to the left, the shoulder of an already raised rod slips off the projection and falls on the lower end of the lever z, whereupon the opposite weighted end of the lever is flipped up and the tablet rod drops down. But when any rod is lifted, its beveled shoulder engages the lower end of the lever, and as the latter cannot move upward out of the way, it acts as a stationary projection upon the bar, and the shoulder pushes the bar to one side a distance equal to the full width of the shoulder.



Indicating Mechanism of Pottin Patent.

The operation of the indicating mechanism of Pottin is very clearly shown in *Defendants' Exhibit Model of Pottin's Patent*, the accuracy of which is not disputed; and is also exhibited in the annexed diagram, which shows one rod ris-

ing and pushing the bar to one side, while another rod has just fallen from its projection. This operation is fully described by the patent as follows: —

> "When any one of the rods *u* rises, its nose *v* slides past the end of a counterweighted lever *z*, which is mounted on a horizontal bar *y*, and so pushes the bar to one side, in opposition to a spring *v'*, which immediately, on the nose *v* having risen above the bar, presses the bar back so as to catch under the nose and so hold up the rod and card until, on the depression of another key of the set, the bar is again moved aside from under the nose *v*; whereupon the rod *u* and its card drop, escaping the lever *z*, which is employed to avoid the necessity for extreme precision in the notching of the bar *y*."

It is clear, then, as was admitted by complainant's brief in the court below, that the Pottin patent not only shows the combination of keys, rods with shoulders, tablets borne by the rods, and longitudinally moving supporting bar, but also attains the result of surely releasing a previously raised rod.

Now this patent showed a plainly operative and practical machine; and Mr. Renwick, complainant's expert, who found all the fault with the prior patents which he could, *makes no attack whatever on the operativeness of this patent.* (See his description thereof, pages 64, 65.)

On cross examination, he expressly admitted that the Pottin patent fully anticipated the alleged result of complainant's patent. (Cross-Intts. 5–8, p. 69): —

> "*Cross-Int.* 5. If I understand your testimony, you have stated that you find in the Campbell and Pottin patents every element of the first claim of the Ritty and Birch patent, except the 'connecting mechanism,' as you understand that phrase: is this correct?
>
> "*Ans.* Yes.
>
> "*Cross-Int.* 6. *And it is your opinion that the object of the 'connecting mechanism,' in your sense of that phrase, is that the rod which has been raised may be released with certainty when the succeeding rod rises?*
>
> "*Ans.* Yes.
>
> "*Cross-Int.* 7. *Is it not the fact that this result was attained by the devices shown in the Pottin patent?*

"*Ans.* *It is.*

"*Cross-Int.* 8. It is your opinion, then, that the combination described in the first claim of the Ritty and Birch patent does not effect a new result, but shows a new mechanical device for producing an old result?

"*Ans.* *It does not effect a new result*, but it describes an entirely new mechanism (*sic.*), operating in an entirely different way to produce an old result."

Mr. Renwick was recalled, after defendant had taken further testimony, and he was again interrogated upon this same subject (Cross-Int. 9, p. 100): —

"*Cross-Int.* 9. Are you still of the opinion that the result accomplished by the Ritty and Birch mechanism was not new?

"*Ans.* I am, so far as the dropping of a tablet rod with certainty is concerned, because that result is accomplished by the English patent to Pottin."

This is the result of a thorough consideration of the case by a most ingenious and subtle expert, and it may be regarded as settled that the Pottin patent is a practical machine, and attains precisely the result of the Ritty and Birch patent. If any contention to the contrary is made by complainant at this hearing, it will be without the support of any testimony from the witnesses in this regard.

2. *The Campbell Patent.*

Another prior patent, of the same class as the patent in suit and the Pottin patent, is that to CAMPBELL, No. 253,506, dated Feb. 14, 1882. (Rec., p. 115.) This patent is owned by the complainant, and was the subject of the other suit brought against these defendants, in which the appeal has just been voluntarily dismissed by this complainant, appellant. The patent is for a cash-registering apparatus, and shows a machine which registers the amount of the sale, and also visually indicates the same by a tablet, ringing a bell to call the attention of the customer.

The patent describes *the same mode of operation* as is set forth by Ritty and Birch (page 115): —

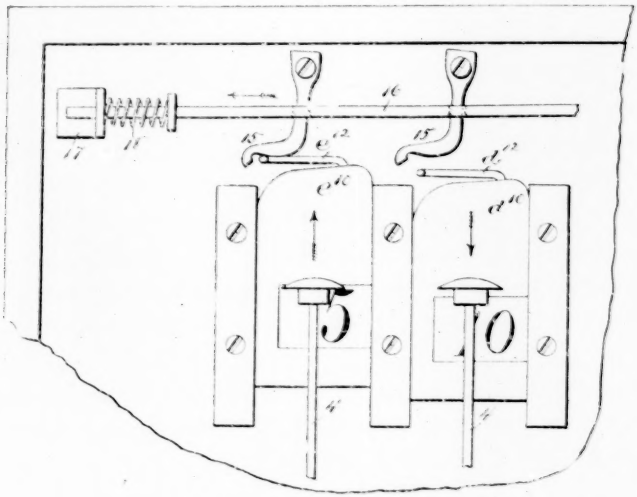
> "Each key operates its own slide, having a visual number, and the slides and numbers made visual at one operation, preparatory to opening the cash drawer, are *simultaneously released and dropped out of sight* as the numbered slides, indicating the sale just made, are being moved into position to be seen, to thus indicate the next amount of cash to be placed in the cash drawer."

The mechanism here in controversy is most clearly shown in Figs. 2 and 4, and is also shown by an illustrative model, entitled "Defendants' model of Campbell machine," which we produce to show the indicating mechanism. There is a series of key levers, d, each bearing a button on which is marked the appropriate number. The rear end of the key lever, by means of a cord and pulley connection, lifts a tablet rod $d^{\times}$, which elevates the slide d^{10}, carrying a corresponding number. The supporting device is a common bar 16, pressed to the right by a spring 18, through which are extended a series of hooks 15. The slide has a finger d^{12}, at its top, which engages with the corresponding hook 15, which thus holds up the tablet. When another tablet e^{10} is raised, the corresponding hook 15 is pressed to one side, thereby carrying with it the sliding bar and all the other hooks, whereby any tablet previously raised is released by its hook and suffered to drop. The diagram on the following page clearly shows one tablet pushing aside the bar, while the other tablet has just been released.

The machine also registers the amount of the sale by the depression of each key, and, furthermore, rings a bell by means of a universal connecting mechanism between the series of keys and the bell, as well as throws open the cash drawer.

Mr. Renwick fully admits that he finds in this machine a series of keys, rods and tablets, and a supporting bar. He states (Cross-Int. 5, p. 69, above quoted), that he finds in this patent every element of the first claim of the patent in suit, except the "connecting mechanism," as he

understands that phrase. In his direct examination (Int. 3, p. 63), he expressly says that this patent "*is substantially the same as the apparatus referred to in the first claim of the plaintiff's patent, save and except that it has no connect-*



Indicating Mechanism of Campbell Patent.

ing mechanism." This, of course, is upon his theory that the sliding bar is the "equivalent" of the plaintiff's wing.

He, further, does not deny that this machine attains the operation set forth in the first claim of Ritty and Birch. The only doubt which he expresses about this machine is as to its releasing a previously raised tablet; and on this point he carefully guards his statement: —

> "The theory of the machine is (I *doubt* if it would be so in practice) that its sliding rod will be moved far enough sidewise by f^{12} to carry the hook pertaining to detent d^{12} so that the tablet rod d^{10} will drop."

But Mr. Shepard fully points out (Int. 4, p. 80) that as the hooks which hold up the tablet rods are in the form of an angle lever, and the bearing point of the detent on each tablet rod is to one side of the axis of the hook, —

> "The further upward pressure of the detent pushes the hooks farther to the left than is necessary to engage the shoulder thereon, and consequently pushes the bar 16 and all of the hooks far enough to the left so as to positively insure the disengagement of such tablet rod or rods as may have been at that time held up by the said supporting and connecting mechanism. I have carefully measured and laid out the parts, and I am confident that the device will operate in the manner which I have described."

(It would be a matter of common sense to make the machine operate in this way, even if the drawings had not shown the exact proportions. For Mr. Renwick expressly admits that this *is* "the theory of the machine.")

Mr. Renwick was called to answer various statements which Mr. Shepard made in this deposition; but he in no wise contradicted this careful and conclusive statement. So that, plainly, Campbell (like Pottin) achieves the result of dropping with certainty any previously raised tablet rod.

Even Mr. Patterson, one of the complainant company, admitted that if the Campbell machine were accurately made, it might operate in this manner (Cross-Int. 35, p. 95).

3. *The Pottin and Campbell Patents show Operative Machines.*

Here, then, are two machines which achieve the result set forth in Ritty and Birch's first claim, and which, furthermore, achieve the result which Mr. Renwick emphasizes, of surely dropping a previously raised tablet rod. They have the combination of keys, rods and tablets, and differ from the combination of the first claim only because they have a sliding bar instead of the supporting wing claimed and described in complainant's patent.

We have just said that Mr. Renwick fully admitted the operativeness of the Pottin machine, and did not seriously attack the operation of the Campbell patent. Mr. Patterson, the vice-president of the complainant company, did not

deny the operativeness of the Pottin machine, but attempted to say that the Pottin machine had not been put on the market. But he based this statement, not on personal knowledge, but on what Mr. Pottin *told him*, which is obviously not competent evidence (Int. 9, p. 91). We could not cross examine Mr. Pottin's *statement* to find out for what reasons the machine had not been sold; no reason was suggested by Mr. Patterson.

Moreover, it is well-settled law that a prior patent is none the less a reference because machines have not been put on the market, if the machine described (like Pottin's) was an operative and practical machine. The question is, whether the prior patent is an operative construction, not the extent of the use of that prior construction.

The Statute provides that a patent may be granted for an invention

> "not patented or described in any printed publication in this or any foreign country before his invention or discovery thereof." (Rev. Stat., Sect. 4886.)

If the prior patent describes a machine that was operative (or even one that might be made operative with immaterial alterations), that patent is plainly a part of the state of the art to limit or anticipate any subsequent patent.

Thus, in *Pickering* vs. *McCullough*, 104 U. S. 310, 319, this Court held that the patent was anticipated by certain prior patents, saying, —

> "It is objected, however, that the machine described in these patents are mere paper machines, not capable of successful practical working. But, on examination, it sufficiently appears, we think, that the objections can be sustained only as to minor matters of detail in construction, not affecting the substance of the invention claimed, and could be removed by mere mechanical skill, without the exercise of the faculty of invention. In this view the Wise and Smith patents are not rendered inefficient as defences in this suit, by reason of the alleged imperfections of the machines described in them."

See, also, to the same effect, —

Electrical Railway Co. vs. *Jamaica R. R. Co.*, 61 Fed. Rep. 655, 669 (TOWNSEND, J.).

Newark Watch-Case Co. vs. *Wilmot & Hobbs Mfg. Co.*, 60 Fed. Rep. 614, 616 (TOWNSEND, J.).

Mr. Patterson's assertion that the Campbell indicating mechanism has not been put on the market is also irrelevant for the same reasons. The fault he finds with the construction of this machine (Int. 16, p. 92) is trivial: he says that strings and pulleys would not be a good connection for raising the tablets. This criticism is not supported by Mr. Renwick; and we see no reason for thinking that it is sound. If strings were not desirable, as a matter of fact, there would be no difficulty in using any other of the well-known forms of connection between the keys and the rods used prior to Campbell's patent.

4. *The Windmüller and Ahrens Patent.*

The WINDMÜLLER AND AHRENS Patent (Rec., p. 149) No. 217,663, July 15, 1879, for a "Register and Indicator," shows a machine of the same class as complainant's. There are a series of keys or pulls D, bearing appropriate numbers, each of which records a corresponding amount by the registers B B' within the case. The operation of the key at the same time exposes an indicating tablet A, bearing a corresponding number, behind an opening in the upper part of the case, and also rings a bell C to call the attention of the customer. When another key is operated, a new tablet is exposed and the former tablet disappears with certainty.

Thus the machine performs all the functions of the Ritty and Birch machine.

The specific mechanism is different in some respects. The actuating keys are in the form of pulls instead of levers; but Mr. Renwick admits (Int. 3, p. 64) that to have

the keys slide horizontally instead of vibrating on a pivot "is an immaterial difference."

These keys are connected by a universal "connecting mechanism" with the bell, so that the operation of any one key rings the bell. (See diagram on page 63). A plate J is pivoted on a rock shaft *e*, and extends over the whole bank of keys (corresponding to plate K of Ritty and Birch); so that any key, when actuated, rocks this plate by means of its projection *m*, and thereby rocks an arm I mounted on the rock shaft *e*, which arm engages with the spring-held lever H, carrying the bell hammer. The indicators A are suspended upon a cord E, which has sufficient slack to permit one of the indicators to be moved to a lower position in sight of the customer. Each key is connected with its indicator by means of a pulley and cord: and the actuation of any key pulls down its appropriate tablet into sight of the customer, and at the same time removes from sight any previously exposed tablet.

The patentees described the operation of their machine as follows: —

> "When it is desired to register a certain amount, say ten cents, the prime mover marked with the figure 10 is pulled outward, whereby *the appropriate indicator A is brought to an exposed position, the proper general register B is actuated and the alarm is sounded.* As the indicator referred to is drawn down it carries with it the chain E, and thus tightens the latter, so that *the indicator previously exposed* (one indicator being always exposed), *is lifted or moved to a concealed position.*"

This machine thus performs every function of the Ritty and Birch patent, and Mr. Renwick, in discussing this machine (p. 99), does not attack its operativeness or deny that it attains the same result as Ritty and Birch. In fact, he expressly admits that the actuation of a key exposes its indicator, and removes from sight the previously exposed indicator. He says that the machine has no tablet rods or supporting wing, which is perfectly true; we cite it as

showing other mechanism for producing identically the same result.

5. The Hardy Patent.

The HARDY patent, No. 231,165, dated Aug. 17, 1880 (Rec., p. 119), for a fare register, is the only other patent which we desire to call to the attention of the Court at this point. Figs. 1 and 4 best show the mechanism, which is widely different from Ritty and Birch's; we call attention to it only as accomplishing the same result.

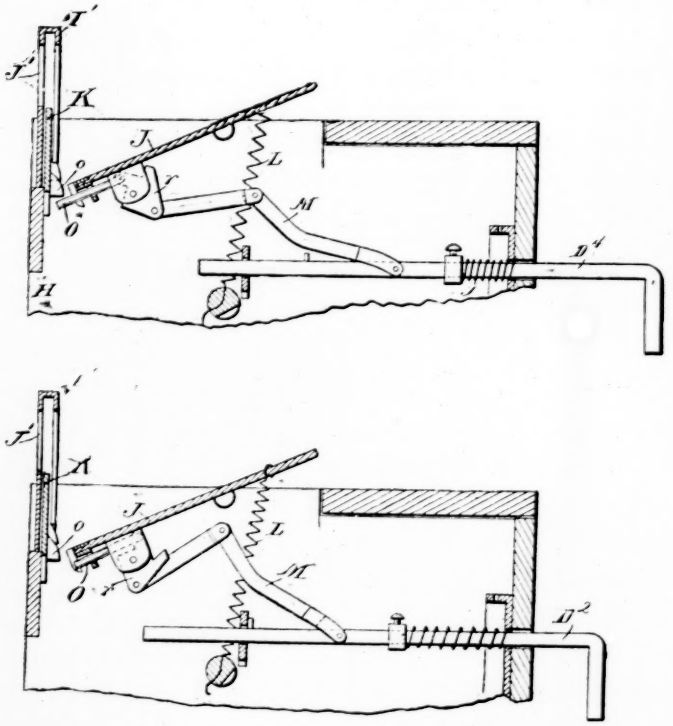
The object of the invention is to register different numbers (being the numbers of fares taken at a time) upon a register within the case, by means of a series of sliding keys projecting outside the case, and also to expose an indicator showing the number registered (at the same time ringing a bell), which indicator remains in sight of the passengers until another key is pulled, when the indicator previously exposed is surely removed from its exposed position.

The machine thus attains the same result as the Ritty and Birch patent, but by different mechanism. There are a series of keys D', etc., which slide horizontally; but Mr. Renwick says (as above quoted) that they are substantially the same as key levers. Each key registers the amount upon the register B within the case.

The actuation of a key lifts an indicating tablet or slide K, bearing a corresponding number, into its exposed position behind the opening J' by the following mechanism: —

There is a tilting plate J, normally held in horizontal position by a spring L. Each key is connected with this plate by a connecting rod M and a lever *r*, which is pivoted below the plate. To the end of this lever *r* is pivoted a sliding bolt O. The actuation of any key depresses the front end of the tilting plate, and at the same time throws out the corresponding bolt O (as shown in full lines, Fig. 1). When the key is released, the tilting plate is retracted by its spring, and the bolt O passes under a lug *a* on the corresponding indicator, and lifts it part way until the edge

of the tilting plate engages with another lug and raises the indicator for the remainder of its upward course. The tablet remains exposed to the passengers until another key or the same key is actuated, whereupon the plate is again lowered, the tablet drops out of sight and another tablet is raised, first by the bolt and then by the plate. At the same time



Indicating Mechanism of Haedy Patent.

the gong P is rung by the spring-actuated lever u, the further end of which engages with teeth on the register. The upper of the annexed diagrams shows the key D^4 as pulled out, and its bolt O about to raise the proper tablet: the lower diagram shows the position at the same time of a key, D^2, which has not been pulled, and its connections, its bolt O being held out of engagement with its tablet.

The operation of the machine is described in the patent as follows: —

> "The fare drops down into the iron drawer, and simultaneously the cylinder is revolved, the number of fares paid at one time is registered on dial C^2, the slide K is thrown up into view, and the gong is sounded. . . . The driver is checked by the watchfulness of the passengers or others in the car, as when fares are paid the attention is attracted to the fact by the appearance of the slide K and also by the ringing of the gong."

Summary of the State of the Art in Cash Registers and Indicators.

The object of the Ritty and Birch patent is to register the amount of the purchase, to expose a tablet to the customer and to call his attention by a bell. When a tablet is exposed, it remains so until the machine is operated to disclose a second tablet, when the first tablet falls out of view.

Mr. Renwick declares that the important object of the machine, as contrasted with most of the prior art, is to remove the previously raised tablet with certainty (see pages 61, 69 of his testimony); though he admits (page 69) that this result was old with Pottin, and though the first claim is not concerned with this matter, as we have pointed out.

As a matter of fact, this entire mode of operation and result is found in all four of these prior patents. They all register the amount, ring a bell and indicate the amount to the customer: and furthermore, the indicator remains exposed until another indicator is brought into view, when the first is removed with certainty.

This is not denied to be the operation of Pottin, Windmüller & Ahrens, and Hardy, and is proved to be also the operation of Campbell.

In view of these patents, complainant's claim, upon which its case was rested in the court below, that Ritty and Birch's patent is "a pioneer patent" and is entitled to receive a "broad construction," and cover mechanisms which are ad-

mittedly not included by the clear language of the claim, seems to us preposterous. The patent only shows, at the most, a specifically different mechanism for accomplishing an old and well-known result.

Comparing these prior patents with the mechanism described and claimed in the first claim of the patent in suit, the specific devices of Windmüller & Ahrens and Hardy are different; for while each has a series of indicating tablets and a series of keys operating the same, the tablets are not raised by means of a series of rods, nor held by a supporting wing which moves aside to permit the passage of the rod, and then engages with the same and holds it up. These patentees employed different mechanism for accomplishing the same general result.

Comparing, however, the Pottin and Campbell machines with what is claimed by Ritty and Birch, we find that (except for the difference between wing and sliding bar) they achieve the specific results set forth in that claim, —

> "whereby, upon operating any one of the keys, the wing is so moved as to permit the passage of the rod, and whereby, upon the release of the key, the wing engages with and holds up the tablet rod and tablet."

And we further find that they do this by a combination of mechanism closely approaching that of Ritty and Birch. Each has a series of keys, a series of rods and a series of tablets, which form three elements of the Ritty and Birch claim. Each differs from the claim by supporting the tablets by a longitudinally sliding bar, instead of by the pivoted, oscillating, straight-edged wing, which is so fully described by and claimed in the patent in suit. Each has proper mechanism for connecting the bar with the rest of the machine to achieve the desired result.

If the supporting wing (which is one element of Ritty and Birch's claim) be construed as complainant seeks to construe it, to cover a longitudinally sliding bar, the claim is obviously anticipated directly by Pottin, which has not only

the elements of the tablets, the keys and the rods, with a detent or shoulder, carrying the tablets, but has also the supporting bar with connecting mechanism, whereby the bar is moved to permit the passage of the rod, and on the release of the key engages with and holds up the tablet rod and tablet. The connecting mechanism, whereby the supporting bar attains this result, consists in the supports on which the bar is moved sidewise, and the spring which draws it back into place.

Moreover, the claim, if so construed, would be anticipated by the sliding bar of Campbell, with its supporting devices and actuating spring.

In view of the state of the art, the Ritty and Birch patent achieves only an old result, by the use of mechanism which differs slightly from the prior art.

It is not necessary, however, for defendant to dispute its *validity*, because the defendants do not infringe the claim as properly construed, in view of its own language and the prior art.

The Ritty and Birch Patent is not a "Pioneer" Patent.

Complainant's attempt to enlarge the scope of the Ritty and Birch patent beyond any fair interpretation of its terms, by declaring that it is a "pioneer" patent, seems to require little argument. For, as we have just shown, the machine of the patent was preceded by several others, which, it cannot be disputed, accomplished the same result.

The most elaborate decision of this Court as to the doctrine of "pioneer patents" is *Morley Machine Co.* vs. *Lancaster*, 129 U. S. 263, 273, where the Court said that Morley was entitled to a liberal interpretation, because he was "the first person who succeeded in producing an automatic machine for sewing buttons of the kind in question upon fabric"; and also finds: —

> "Where an invention is one of a primary character, and *the mechanical functions performed by the machine are, as a whole, entirely new*, all subsequent machines which employ substantially the same means to accomplish the same result are infringements."

In the same clause, this Court contrasts an improvement patent: —

> "*He was not a mere improver upon a prior machine, which was capable of accomplishing the same general result; in which case, his claims would properly receive a narrower interpretation.*"

Is it not plain in which class the Ritty and Birch machine must fall?

The cases cited by this Court in the Morley case follow the same principles: —

In *McCormick* vs. *Talcott* (page 274), the distinction was between "the original inventor of the device or machine called the divider" and the case where the invention claimed was "*but an improvement on a known machine* by a mere change of form, or combination of parts."

In *Railway Co.* vs. *Sayles*, the distinction was between one inventor who "preceded all the rest," and the case where "the advance toward the thing desired is gradual."

In *Clough* vs. *Barker* (page 275), Clough was "the first who applied a valve regulation of any kind" to the combination and was therefore a pioneer.

In *Consolidated Valve Co.* vs. *Crosby Valve Co.* (pages 276, 277),—

> "No prior structure was known or recognized as *producing any such result* as that produced by Richardson's apparatus."

In *Curtis* vs. *Platt* (page 280), the distinction is clearly drawn between the case where the result is new, and one "*when the object itself is one which is not new, but the means only are new.*"

In *Proctor* vs. *Bennis* (page 282), the distinction is drawn between the case where "there was not only novelty

in the machine, but *novelty in the result to be produced by that machine*," and the case of "mere improvements in an old machine for an old purpose."

The doctrine of *Morley Machine Co.* vs. *Lancaster* has recently been quoted and approved by this Court in *Miller* vs. *Eagle Mfg. Co.*, 151 U. S. 186, 207.

There is no mystery about the word "pioneer," and the doctrine laid down by this Court is perfectly plain. Applying it to cash registers and indicators, the first man who combined groups of mechanism, whereby the machine automatically registered the amount, indicated the same to the purchaser, and rang a bell to attract his attention, would properly have been called a "pioneer," and entitled to a broad range of mechanical equivalents for producing a new result; but not only did a number of prior patentees show different combinations of mechanism for accomplishing this very result, but two of them used the combination of keys, tablets, tablet rods and a supporting device as the indicating mechanism of their machines.

The argument that Ritty and Birch were "pioneers," and therefore entitled to cover substantially different forms of mechanism, seems to us clearly to require no serious answer.

Construction of the Defendants' Machine.

The defendants' machine is a cash register and indicator of the same general type as the Pottin and Campbell as well as the Ritty and Birch machine. It has a series of pivoted keys with numbered buttons upon the ends of the keys, which project in front of the case. Upon the rear ends of the keys are supported a series of tablet rods, having tablets at the top thereof. The machine also has a registering mechanism, which is not in question here.

Here the resemblance between complainant's and defendants' machines ends. The defendants' machine has no pivoted supporting wing, such as is shown in complainant's patent;

neither are the tablets bent upon the rods in the manner shown in the Ritty and Birch patent; neither has the machine the flat arms J, link, trigger and bent lever L with follower, nor any one of these devices; neither do the projections upon the rods ever come in contact at all with the supporting device used in this machine until it has returned to its normal position to support a rod already raised.

The actual construction of the machine is undisputed, and is shown in the Exhibit Defendants' Machine. There are two banks of keys, each with its own registering mechanism, which may, complainant says, be considered as two machines; all but two tablets have been removed from the left-hand bank. The tablet rods are arranged in four rows, with the tablets set in the same perpendicular line as the rods which respectively support them. A sliding bar which reaches across the whole of the machine is arranged upon the guide frame in which the rods slide up and down, and is held by springs in its normal position. This bar is in front of the rods, and from its rear extend projections of different lengths, one projection opposite each rod, and suited in length to the distance from the rod to the bar. Upon the front of each rod is a projection with which, when the rod is elevated, the corresponding projection upon the bar engages to hold up the rod and tablet. Upon the operation of any key, this bar is made to slide to one side against the stress of its spring, by one of two similar mechanisms connected respectively with the right and left hand bank of keys.

The construction of this mechanism is as follows: A plate is hung by lugs upon the same shaft upon which the keys are pivoted, and extends above the whole bank of keys, so that when any key is operated this plate is lifted. Upon the left-hand end of the plate is a pin which engages a bell crank lever pivoted upon an arm projecting from the bottom of the machine, the forward end of this lever being operated by the pin upon the plate, while the other end has a cam upon it, which engages with another cam upon an arm projecting

downward from the sliding bar. The forward end of this lever is pulled downwardly and to the left by a spring. When any key is operated, the cam end of the lever is depressed by means of the pin on the plate which lifts the other end of the lever; this cam end slides down the cam connected with the sliding bar, and thus throws said sliding bar to the left. At about the time when the key is completely depressed, the cam upon the lever comes below the end of the cam upon the sliding bar, and the bar is immediately pulled back into its normal position by its spring. A bell hammer is actuated by the bar, and rings the bell when the bar snaps back. As the key falls back to its normal position, the cam upon the lever moves upward again upon the left side of the cam upon the sliding bar; and then by the force of the spring attached to the front arm of the lever, the lever cam is snapped back into its place at the right of the sliding-bar cam, ready to slide the bar again at the next operation of a key.

Defendants' Machine Compared with Plaintiff's Patent and the Prior Art.

The defendants' machine produces the same result which is produced by Ritty and Birch, and which was also produced by the four prior patents above discussed, — that is, it registers the amount of the purchase, rings the bell and exposes a tablet, which remains exposed until another tablet is lifted, when it disappears from sight. *So far as the indicating mechanism described by Ritty and Birch, and referred to in Claim* 1 *is concerned, defendants' machine contains not a single feature referred to in that claim, which distinguishes Ritty and Birch from the state of the art.*

Defendants' machine has the series of keys, the series of rods, each provided with a detent or shoulder, and the series of indicating tablets carried by the rods, which were old with Pottin, and also, in a slightly different form, with Campbell.

The corresponding devices described in complainant's patent differ from the prior art only in the particulars that the rods are in a straight line, and the tablets are twisted, some forward and some back, so as to overlap, while the detents on the rod have beveled operating faces, which are described as pushing back the supporting device. These peculiarities defendants' machine does not display, as is admitted.

As to the other element of the claim (namely, the "supporting wing with connecting mechanism," which oscillates backward and then returns and engages the rod), *defendants' machine has no such device, but employs the sliding bar of the Pottin and Campbell patents*, which is moved to one side to permit the passage of the rod, and then is returned to place by a spring to hold up the rod in its elevated position. It has a "connecting mechanism" to attain this result, consisting of proper supports and an actuating spring, all as found in these prior patents.

The proper construction of the first claim we have fully discussed: The claim sets forth a combination of elements and also the function or operation of that combination, which was old in the art. Only one of those elements — the supporting wing — was new in this combination. The defendants attain the old result by a combination which does not contain that one novel element.

The patentees "cannot now declare an element of their claim to be immaterial."

Moreover, the operation of the patented combination is fully described in the patent: the "beveled operating faces" on the rods push back the wing. Such operation is referred to in Claim 1. But in defendants' machine the detents on the rods are merely supports: *they never come in contact with the supporting bar, and take no part in moving it aside.*

We submit that the question of infringement is free from difficulty.

Moreover, the train of actuating devices which the patentees used to aid the detents on the rods in pushing back

the oscillating wing are not found in defendants' machine, even if they are embraced in the first claim of the patent, which we submit is not the case. Those instrumentalities, which are very specifically described in the Ritty and Birch patent, consist of two arms J, pivoted on the same shaft as the keys, their lower portions supporting the universal bar under the keys, and their upper portions connected with a link which, in turn, is connected with the trigger, which trigger actuates a bent lever and follower. Nothing of this train of mechanism is found in defendants' machine. The supporting bar is moved to one side by means of a pin on the plate over the keys, which pin actuates a bell crank lever, which moves aside the supporting bar by a direct action on the cam arm thereof. Pivoted arms, link, trigger, and elbow lever with follower are not found. There is no likeness at all, specifically, between plaintiff's and defendants' devices, any further than that both move the supporting device.

We submit that Judge Colt was clearly right in the following finding (page 218): —

> **"The defendants' machine is of the Pottin and Campbell type. It has what is common to all these machines, a series of keys pivoted upon a bar, and a series of tablets with numbers thereon. It has also a registering mechanism, but here it seems to me the resemblance between the two mechanisms ceases. It has no pivoted supporting wing, such as is shown in the patent in suit, but instead thereof, it has a sliding bar with projections, which reaches across in front of the rows of tablets, and is arranged upon a guide frame in which the rods slide up and down. The tablet rods are not bent as in the complainant's machine, nor do we find the same connecting devices, such as the flat arms J, link, trigger and bent lever L, with follower."**

It does not require citation of authorities to show that where the defendant follows the prior state of the art rather than the distinguishing features of the patent in suit, there is no infringement. For example, in *Western Electric Co.* vs. *Ausonia Co.*, 114 U. S. 447, 451, this Court held: —

> "Another answer to this contention of the appellant is that in this respect the defendant follows the Baudouin [prior art] and not the Olmstead [patented] process."

So, also, in *Union Paper Bag Machine Co.* vs. *Hollingsworth Co.*, 56 Fed. Rep. 224, 228, the Circuit Court of Appeals for the First Circuit held that there was no infringement, saying, —

> "The defendant's machine is organized more upon the principle of the older machines."

See to the same effect, *McCormick* vs. *Graham*, 129 U. S. 1, 18.

We submit that any construction of the first claim which covers defendants' machine is in violation of the *clear* language of the specification and claim, and would also make this claim absolutely invalid, in view of the state of the art.

The Distinctions between an Oscillating Wing and a Sliding Bar.

Complainant takes the position, by its expert, that the distinction between a supporting wing and longitudinally moving bar is entirely unimportant. This is only the attempt — so often repelled by this Court — to declare a feature immaterial which is an element of the claim, and which is described in the specification as an essential feature of the combination.

If the distinction is *not* material, there is no difference between the combination of the first claim and what is shown in the prior art.

Mr. Renwick attempts to say that an oscillating wing was a "known substitute" for a sliding bar; and he finds such an oscillating wing in the Hardy patent, above described. But (as is well pointed out by Mr. Shepard, p. 80,) this patent

> "does not have an oscillating wing which is continually pressed against all of the tablet rods, and which merely swings back into place to hold up the rod."

Instead of this, it has a tilting plate, as above described, which dips downward and picks up a tablet by means of a bolt attached to the plate. The tablet is *raised* by the plate on the release of the key. This patent does not, therefore, show a supporting wing like that of the Ritty and Birch patent, and, as Mr. Renwick stated, it has no tablet rods. Its whole mechanism is different, as we stated above.

Complainant also seeks to find an oscillating wing in the old patent to Russell of Oct. 10, 1829, for "Improvement in Bell Hanging." But we shall not discuss this patent, as it is obviously a machine of wholly different construction, and it is not mentioned in the Record, although Mr. Renwick testified after it had been introduced in evidence (page 94).

The differences between the wing of Ritty and Birch and the sliding rod of defendants and the prior art are obvious. The supporting wing is fully described in the patent (page 111), as "a forwardly inclined wing pivoted at its lower edge, and resting at its upper edge against the rear sides of the upper portions of the rods F." This wing "is free to vibrate on its pivotal axis," and "is yieldingly held against the rods by any suitable spring." It swings to and from the line of rods.

The advantages of this device may be found in its simplicity and cheapness of construction. That is, the rods are arranged in a single row, and this plain, straight-edged wing presses against them, which makes a simple and inexpensive structure. Another advantage of pivoting the wing in this way, instead of making it slide, is its ease of working, and the avoidance of any tendency to bind or cramp. (See Shepard, p. 44.)

The defendants' supporting device, on the other hand (like that of Pottin and Campbell), slides lengthwise along the line of rods, instead of swinging to and from the line. It must, therefore, have (as in these previous structures) a series of projections to engage with the detents on the rods, which projections are dragged to one side, and so disengage the detent of any rod already raised. It thus possesses neither of the

advantages of the Ritty and Birch wing. The defendants' machine has the rods in several rows, a construction which would be impossible with the plain wing of the Ritty and Birch patent.

It is significant that *in the Ritty and Birch machine a lengthwise sliding bar like defendants' could not be employed, nor could an oscillating wing be employed in defendants' machine.* (Shepard, pp. 52, 53.) If such a sliding bar were substituted for the wing of the Ritty and Birch patent, it could not be actuated by the detent on the rods, nor by the "connecting mechanism" there described. On the other hand, if it should be attempted to use the oscillating wing of Ritty and Birch in defendants' machine, it would be impossible to have the rods in several rows, as is now the case; and, furthermore, the "connecting mechanism" would have to be entirely reconstructed. Moreover, what the complainant calls the "connecting mechanism" of Ritty and Birch could not be used in defendants' machine, nor could the "connecting mechanism" of defendants be used in the Ritty and Birch machine.

It is well settled that "this interchangeability or non-interchangeability is an important test in determining the question of infringement." *Miller* vs. *Eagle Manufacturing Co.*, 151 U. S. 186, 208, and cases cited.

We advance these points as arguments *a fortiori;* for the conclusive point upon the question of infringement is that the Ritty and Birch patent is, at the most, but a different combination of mechanism for attaining an old result, and that as defendants do not use one element (and that the only novel element) of the claim, they, obviously, do not infringe. The express language of the claim and specification, as well as the state of the art, forbid that the words "supporting wing" should be read out of the claim. Again, defendants do not actuate their supporting device in the manner described by the patent.

The remainder of our brief deals with the state of the art

as forbidding complainant's interpretation of the patent. If we have already satisfied the Court that such interpretation is impossible, in view of the language of the patent, the following argument is superfluous: but we present it for the sake of completeness.

Plaintiff's Theory of "a Single Connecting Mechanism."

After defendants' expert, Mr. Shepard, had given his first deposition, it became obvious to complainant that upon any "fair interpretation" of the patent in suit, there would be no infringement. For if the first claim should be so wrested from its natural meaning as to make "wing" mean "sliding bar," the claim would be anticipated by Pottin and the other prior patents. Complainant, therefore, proceeded to reconstruct the Ritty and Birch patent without a reissue from the Patent Office, and to make it cover a supposed invention, which was neither referred to in the claim here in issue nor set forth in the specification. This matter we have discussed above (pages 23–31).

The insignificant words "with connecting mechanism," in the first claim (which also occur in the fifth claim with obviously different meaning), were selected as alone giving novelty to the first claim, and as meaning "a single connecting mechanism" from the keys to the supporting wing; and complainant's case was staked upon the proposition that by the use of such mechanism the patentees had attained the result of surely releasing a previously raised tablet (see Mr. Renwick's testimony, *passim*).

But *this result was not new*, and was admitted by Mr. Renwick to be old with Pottin (Cross-Int. 7, p. 69), as it was also with other prior patentees.

Moreover, "*a single connecting mechanism*" *is not necessary to accomplish this result*, as complainant implies. At most, it is one of several means of accomplishing the result.

The purpose of this "connecting mechanism" in the patent

in suit (as described by Mr. Renwick, page 61 and elsewhere), is to throw the supporting wing so far rearward that the detent of a previously exposed tablet rod will have ample space to fall in. *The patent says nothing about this;* in fact, it says that the detent and the "connecting mechanism" unite in pushing back the wing; however, let it be assumed that such *is* the mode of operation.

The detent of a tablet rod can be cleared from its support just as well without "a single connecting mechanism," from the keys to the support. Pottin used the simple expedient of counterweighted levers attached to his supporting bar to move the bar so far to one side that a previously raised rod will be sure to drop. So, also, in Campbell, the last raised tablet forces its hook and the supporting bar so far to one side that any previously raised tablet is sure to fall. (See the diagrams, pages 34, 38.) *There is no need of "one single connecting mechanism" between the keys and the support to accomplish this old result. It is a choice of mechanism. This cannot be disputed.*

Reference to the two diagrams on pages 86, 87 will show two simple and perfectly effective forms of mechanisms connected with each rod for effecting this operation. Complainant's assertion (unsupported by testimony) that a machine would be "worthless" without "a single connecting mechanism," is absolutely erroneous.

We desire to emphasize the fact that the use of a "single connecting mechanism," instead of separate connections from each rod to the bar, does not affect the operation of the machine in any particular.

Complainant's position, in a word, is this: That the first claim of the Ritty and Birch patent covers broadly the combination with the four elements of keys, tablets, rods, and supporting device of any kind (admitted to be old in combination), of a single "connecting mechanism" between keys and supporting device, whereby the movement of any key would move the supporting device; and that, as defend-

ants used such a "connecting mechanism" (though in a very different form) to move aside their supporting bar, there was an infringement.

Complainant's attempt is to cover by this patent the use of any kind of "a connecting mechanism" between the keys and supporting device of a cash register. Such a claim is utterly unwarrantable in view of the clear language of the Ritty and Birch specification and claim (as we have fully pointed out), and of the further fact that the invention is not a "pioneer invention," but only an improvement in mechanism to attain an old result.

"Connecting Mechanism" was Old and Well Known.

If, however, the language of the patent could bear complainant's interpretation, it is clear that the patent would not show a trace of patentable invention, for the use of a single "connecting mechanism" between a series of keys and devices to be actuated thereby was one of the commonest devices in machines of this class, as Mr. Shepard's deposition proves. Indeed, complainant was obliged to admit in the court below that "connecting mechanism," substantially like the devices of Ritty and Birch, had been well known in the prior art. It is a great many years since the inventor of a register, an indicator, a typewriter, or other machine employing a series of keys each adapted to do some individual work essential to the operation of the machine, *desired that each key should perform not only its own individual work of adding, or writing, or indicating, but also that all the keys should perform some one common operation.* To such inventor it was obvious that a separate mechanism connected with each key could ring a bell or do any other common operation; but it was also an obvious expedient to have a common mechanism leading from the series of keys to the device to be operated; and the usual form in which this has been used for many

years consisted in a *common bar*, under or over the bank of keys, which would be affected by the upward or downward movement of any key, and which would transmit its motion to the bell or other object to be moved.

The first man who devised this common bar solved the entire problem of moving anything that it was desired to move by a "connecting mechanism" between that object and a series of keys; and no broad invention remained for any subsequent inventor in this line.

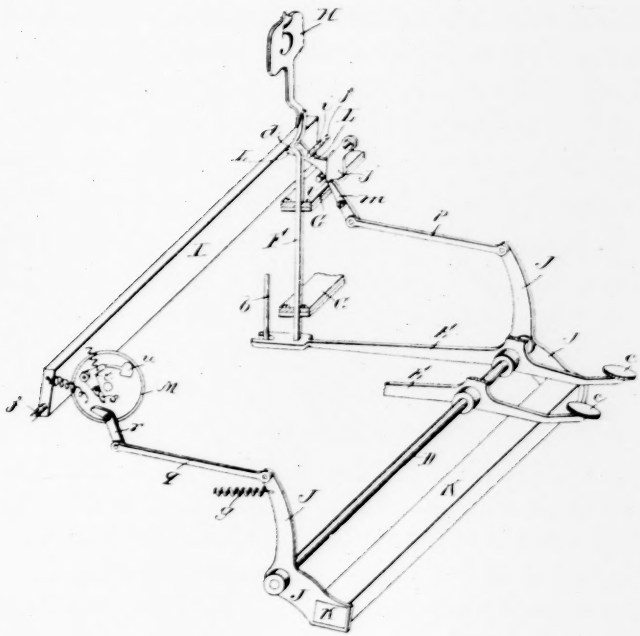
Complainant's position is that each man who employed this common bar to move something different from his predecessor is entitled to a "pioneer patent"! So that, for example, one man would be entitled to a broad patent for using "a single connecting mechanism" between a series of keys and a bell hammer; a second to a pioneer patent for using this same "single connecting mechanism" between a series of keys and a drawer; a third for using this "single connecting mechanism" between a series of keys and a moving carriage; and then Ritty and Birch for the use of "a single connecting mechanism" between the old series of keys and the old supporting device. *And this is not a travesty but the actual contention of the complainant in this case.* For the prior art shows the common use in such machines of "a single connecting mechanism" between the series of keys and all sorts of different objects to be moved by them.

It must be borne in mind that all that is common to the patent in suit and defendants' machine is the use of a *common bar*, extending *over* all the keys in the patent, and *under* them in defendants' machine; and *some* means of transmitting motion from the common bar to the supporting device.

The Ritty and Birch patent shows as the "connecting device" here under discussion a common or universal bar K, extending under all the arms, which is depressed by any key, which thereby actuates an arm J, at each end of

the machine, which, by means of a connecting link, trigger, and bell crank lever with follower, *rings a bell at one end of the machine and moves the supporting wing at the other end. The two mechanisms are precisely identical* (*supra*, page 9).

The annexed diagram illustrates these twin trains of mechanism, as shown in the patent drawings; the bell-crank lever



Ritty and Birch's Two Trains of "Connecting Mechanism."

L is aiding the detent on the rod to push back the wing, and is about to disconnect from the trigger *a* and snap back into place; while the bell-crank lever *t* has just disconnected from its trigger *r* and snapped back into place. The identity of the two trains of mechanism is palpable.

The question of the patentability of these devices must stand or fall together. If it be not new, as it is not, to use

such a train of connecting mechanism (apart from its specific form) to actuate the bell, it cannot possibly be patentable to use precisely the same train of mechanism to give the desired motion to the supporting wing. No balder case of a "double use" could well be imagined.

1. *Patents to Windmüller & Ahrens, Howie and Capron.*

We will take up, in the first place, three patents, which show the use of a "single connecting mechanism," whereby any of the series of keys rings a bell, exactly as in the Ritty and Birch patent. This is accomplished by the "*common bar*," actuated by any key, and transmitting its motion to the bell.

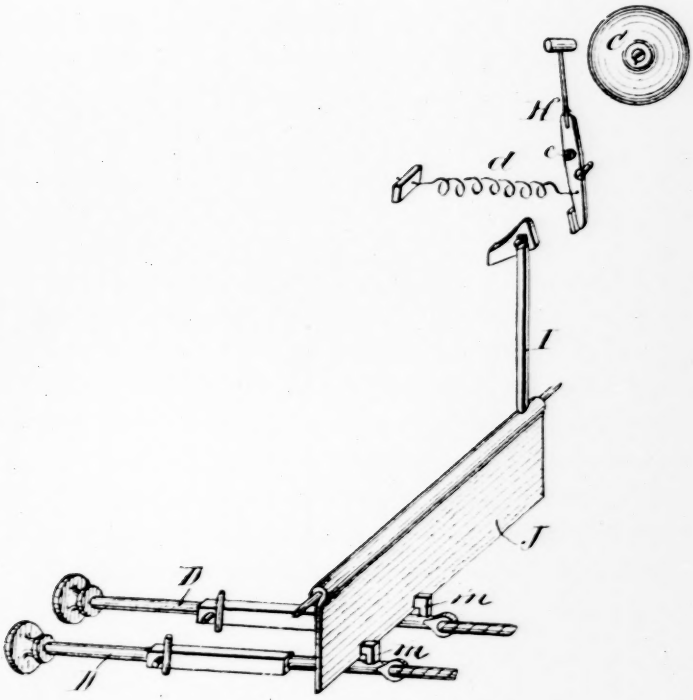
Patent to *Windmüller & Ahrens*, No. 217,663 (above described, page 41), shows a machine like that of Ritty and Birch, for registering, indicating, and ringing the bell. Each key is not connected with the bell by a separate arm, but there is a common plate or bar J, extending over all the keys, and actuated by any one of them, which plate, by an arm I with a follower, actuates the bell hammer H to ring the bell. The arm I disconnects with the bell hammer H as the key is being operated: whereupon the hammer H is pulled back by its spring and strikes the bell. The arm I is allowed to return to place past the bell hammer, on the release of the key, by means of the follower on its upper end, which flips out of the way just as does the follower s in the Ritty and Birch connecting mechanism. This bell-ringing mechanism is clearly shown in the opposite diagram.

Here is the same connecting mechanism (apart from specific details) between a series of keys and a bell, as in Ritty and Birch; it is in a machine of exactly the same class, and operates in precisely the same manner.

Complainant's expert, Mr. Renwick, admits (Int. 9, p. 100): —

> "*If the suit had been brought upon the fifth claim of the patent in suit* [the claim which refers to the bell-ringing mechanism], *the patent to Windmüller and*

Ahrens would have been in point as a reference which would narrow the claim."



"Connecting Mechanism" of Windmüller and Ahrens Patent.

If, then, as Mr. Renwick admits, there was no invention broadly in using the "single connecting mechanism" of Ritty and Birch, between the series of keys and the bell, how could there be invention in using precisely and identically the same connecting mechanism on the other side of the machine, between the series of keys and the supporting wing? There never was a plainer case of a mere "double use."

Other patents showing the use of a universal bar extending under or over a series of keys, and actuating a bell, are as follows: —

Patent to *Howie* for a recorder, No. 185,537, shows a series of numbered keys B, a shaft G^1 with projections g^3 extending under all the keys (so that the depression of any key rocks the shaft), and a rearwardly projecting arm g^4 with a "follower" or trip to engage the bell hammer. Mr. Renwick admits of this patent also (page 100), that

> "If this patent were set up with reference to a suit brought under the fifth claim of the patent to plaintiff, it would be in point."

The patent to *Capron*, No. 110,547, is for an annunciator. It shows a series of crank levers *b*, having a *common bar h* across their upper surfaces. This bar is connected by wires with the lever *i*, and the lifting of any one of the bell crank levers *b*, therefore, operates the common bar and the lever *i*, and thereby actuates the bell hammer *k*, which has a follower *l* for the purpose of disconnection. Mr. Renwick admits of this patent that, —

> "*It has a bell-ringing mechanism, which is in some respects very similar to that shown in Fig. 3 of the Ritty and Birch patent*" (page 99).

Here, then, are three patents admitted to show the use of a "single connecting mechanism" directly leading from keys to bell, in the form of a common bar and motion-transmitting devices.

Other patents in cash registers and indicators which show a universal connection between a series of keys and a bell are those to Pottin, Campbell and Hardy (as above described); Pottin shows a *common bar k*, extending over all the key levers, and lifted by the operation of any key and thereby actuating the striking lever of the bell T.

To sum up, Ritty and Birch show an identical train of mechanism at each end of the machine for ringing the bell and moving the supporting wing. There is no advantage in such connection over a separate connection from each key, except cheapness and simplicity. The use of such

single connecting mechanism between the series of keys and the bell hammer was not new with Ritty and Birch. How can it be even plausibly claimed that the use of identically the same mechanism between the series of keys and the supporting wing, in place of having a separate connection between each key and the wing, was a "pioneer" invention, or any invention at all, with Ritty and Birch?

2. *The Typewriter Patents.*

Other patents showing the use of a common bar, actuated by any one of the series of keys to transmit motion, are those on the familiar form of typewriter, as shown, for example, in patents to Deming, No. 176,518; Sholes and Glidden, No. 200,351, and Allen, No. 185,714. These patents all show a series of key levers, with lettered buttons projecting forward, as in the cash register machine.

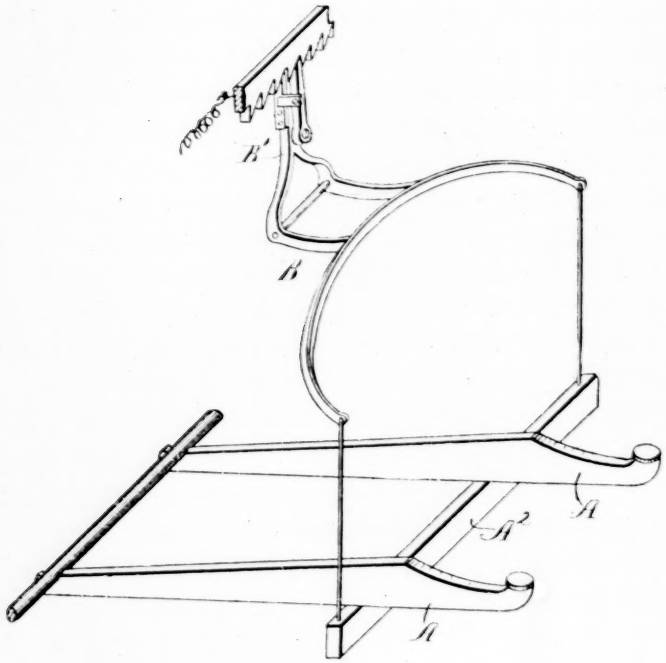
A common bar, spoken of in these patents as "*the usual cross bar*," extends along the whole line of keys, in most cases beneath the keys; and the depression of any one of the keys not only performs its individual action of printing its particular letter upon the paper, but also depresses this common bar. The bar is connected by upright arms with the forward end of a pivoted bell crank lever.

The upper end of the bell crank lever carries two ratchets, one rigid, and the other pivoted and actuated by a spring. The downward movement of any key, by means of the "single connecting mechanism," rocks the upper end of the bell crank lever and carries the stiff ratchet into a notch in the rack bar on the paper carriage; the pivoted ratchet is released from that notch and flies back one space. When the key is released, the bell crank lever returns to its place, thereby carrying the rigid ratchet out of its notch and the pivoted ratchet into the next notch; whereupon a spring pulls along the carriage one notch, when the operation is again ready to be repeated.

Thus the actuation of any key not only prints its particular

letter, but depresses a common bar, which, by means of a bell crank lever or other similar mechanism, permits the carriage to be moved one space by a spring. The close resemblance between this device and the "connecting mechanism" of defendants cannot escape notice. In defendants' machine, any one of the series of keys actuates a common bar, which operates a bell crank lever, which moves the supporting bar to one side and then suffers it to be retracted by the force of the spring.

The *exact* "connecting mechanism" of these typewriters could be employed in defendant's machine.



"Connecting Mechanism" of Deming Patent.

In the *Deming* patent, the common bar A^2 under the keys A is connected with the elbow lever B by an arm or wire at each end, which elbow lever, in turn, by its bifurcated

upper arm B', engages the spring-actuated carriage. The annexed diagram clearly shows these parts of the machine.

In the *Sholes and Glidden* patent, the common bar under the keys is V; the connecting arms are W W; and the carriage-actuating mechanism is an arm U, an arm O, and a ratchet N, engaging the ratchet wheel K.

In the *Allen* patent, the common bar over the keys is lettered "C^1", and is connected by an upright arm with the double pawl C^2.

3. *The Patents for Adding Machines.*

The patents to Plumb, Forrester, and Borland & Hoffman relate to adding machines, which are machines for adding up the amounts belonging to the several keys and for indicating the sum of such amounts. They have a series of pivoted keys, each bearing its individual number, and a single "connecting mechanism" from the series of keys to the indicating devices.

The patent to *Plumb*, No. 256,591, shows a series of key levers J, representing different numbers and pivoted on the horizontal shaft G. Over the rear ends of these keys runs the *common bar* M, supported on arms L and held down by springs upon the keys. The actuation of any key, therefore, moves this common bar, which, by means of a pawl N, revolves the wheel H affixed to the shaft G, thereby turning the unit wheel C, also affixed to the shaft G, and showing the appropriate number through an opening in the case within which the registering mechanism is enclosed. Each key is moved a different distance and thereby moves the unit wheel C the proper number of units.

This patent clearly shows the use of a common bar supported by arms as a connecting mechanism between the series of keys and the indicating mechanism, although, of course, the indicating mechanism is quite different in form from that of Ritty and Birch.

The patents to *Forrester*, and *Borland & Hoffman*, show

a rock shaft which is turned by the depression of any key, and by intermediate connecting mechanism actuates an index. The machines are, in general, of the same character as that of Plumb, and do not require further discussion.

We do not contend that any of these typewriters or adding machines show the tablets and tablet rods of Ritty and Birch. What they show is the common use of a single connecting mechanism between the series of keys and any object which it was desired to move, in the form of a common vibrating bar moved by any one of the keys, and a single bell crank lever or other device for transmitting the appropriate motion from this common bar.

4. *The Campbell Patent.*

The Campbell patent, above described, also has considerable bearing upon this question. This shows not merely a "connecting mechanism" between the series of keys and the bell, but also a "connecting mechanism" in the shape of a bar c between the series of keys and the drawer holder. Each key has a toggle lever 10-8, and the depression of any key thereby throws the bar c to the left, as shown in Fig. 9. It thereby closes the arms of another toggle lever b, one arm of which is attached to the bar c, and the other end to the fixed bar c^2, and thereby depresses one end of the lever D (Fig. 2), and raises the drawer holder from the drawer, thereby suffering the drawer to be opened by a spring.

It was on this patent that complainant brought the other suit above mentioned against these defendants, alleging that the defendants' use of a "single connecting mechanism" between a series of keys and the drawer holder was an infringement of this patent.

Defendants' means of opening the drawer is like their means for moving the supporting bar: that is, the common plate over all the keys has a projection which lifts the drawer holder.

Complainant's position is, that after Pottin, Campbell,

Windmüller & Ahrens and the rest had used in cash registers and indicators a common bar actuated by the series of keys, for the purpose of actuating a bell hammer lever, and after Campbell had used the same mechanism for the purpose of actuating the drawer holder, Ritty and Birch could enter this field and claim broadly the use of the same actuating mechanism for the purpose of moving the supporting device. It seems to us that this position is evidently untenable.

The "Connecting Mechanism" of Defendants' Machine.

The entire want of merit in complainant's claim to monopolize the use of any sort of single train of mechanism to move any sort of supporting device can be plainly seen by consideration of the alleged infringing machine.

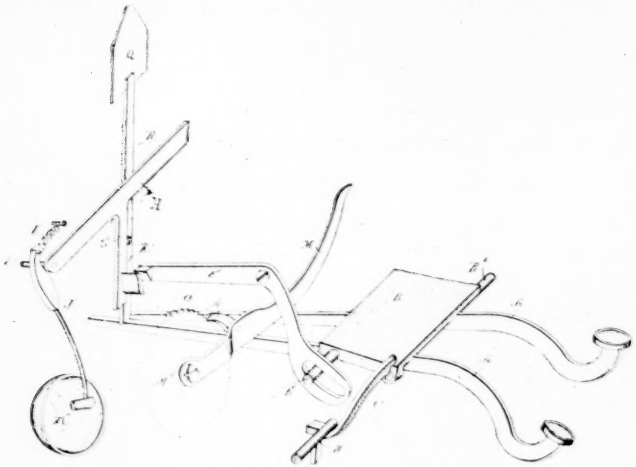
It is fully admitted by complainant that the so-called "connecting mechanism" used by defendants to move their supporting device was old in machines of this character to move other objects. It is also fully admitted by Mr. Renwick that the result which he ascribes to the use of such mechanism (namely, the moving of the supporting bar far enough to drop a previously raised tablet), could be effected by the use of separate connections from each key, and was, as a matter of fact, old with Pottin, as it was also with Campbell. It is also admitted that all the other elements of defendants' machine here in controversy were old in combination for the same purpose.

Complainant's remarkable position is, that though the art disclosed in many patents the use of a single connecting mechanism from a series of keys, to do what a separate connection from each key would also accomplish, thus attaining the same result by simpler means, yet the defendants had no right to use in the Pottin machine such old connecting mechanism in place of separate connecting mechanism from each key, although the effect is exactly the same as in other cases.

namely, that the old result is achieved by one train of devices instead of several separate devices.

The bare statement of this position, when stripped of a cloak of verbiage, seems to show its untenable character.

Our argument is further emphasized by a glance at the various "connecting mechanisms" employed in defendants' machine. Each key was to perform its individual function of raising its particular tablet, and also four functions which were common to the whole series, namely, moving a



"Connecting Mechanism" of Defendants' Machine.

register, ringing a bell, opening a drawer and moving a supporting bar. As would be expected, therefore, there is a separate connection from each key to its individual tablet, and there is a common connection from the series of keys to register, bell, drawer-holder and supporting bar alike. These "connecting devices" are substantially of the same character, and are clearly shown by the annexed diagram, which shows only two keys (the left-hand key being partly depressed), and omits other parts of the machine.

Over the series of keys A is pivoted at M a curved uni-

versal bar M, which carries a pawl N, engaging with teeth upon the registering device O. The movement of anyone of the series of keys actuates this universal bar, and thereby moves the registering device a distance varying according to the key actuated. Universal connections from the series of keys to the registering devices were shown in the Pottin patent (where the bars *f* and *f'* are severally actuated by any one of the two series of keys to move the registering devices), as well as in the adding machine patents above described.

There is also pivoted at B' over the keys a vibrating plate B, which is moved by any one of the keys. This plate, by a projection C upon its end, lifts a drawer holder D. A universal connection between keys and drawer holder — though of a widely different character — was previously shown in the Campbell patent, as above set forth.

This universal bar or plate B also actuates the supporting bar H in the manner above set forth, by means of the pin E, a bell crank lever F, and a cam arm G on the supporting bar, and at the same time actuates a bell hammer lever J, which is moved to one side by a pin I on the supporting bar, and retracted by a spring L. Such "universal connecting mechanism" between the series of keys and the bell was old (as we have said) with Windmüller & Ahrens, Howie, Capron, Pottin, Campbell and Hardy, and is also found in the typewriter patents.

In short, the art prior to Ritty and Birch showed the familiar use of universal connections between the series of keys and the drawer holder, the bell and the register. Defendants used such connections in their machine. Can it be contended that defendants did not have the right to avoid useless repetition in their machine by using that same single connecting mechanism to move their supporting bar, instead of the useless complexity of separate connections with each key, for effecting precisely the same result?

The Alleged Feature of "Disconnection."

Certainly, the "connecting mechanism" of the prior patents *operated* just like that of Ritty and Birch, *i. e.*, they simply transmitted motion from any key by means of a common bar.

Mr. Renwick emphasizes as a feature of the "connecting mechanism" of complainant's patent, that the parts thereof "disconnect themselves" during the operation of the key. All that this means is that during the operation of a key, the "trigger" *m* slides off the follower *l*, so that the bell crank lever L returns to place and the wing is pulled back into position by its spring. So, also, in ringing the bell in complainant's patent, the trigger *r* disengages with the follower on the bell crank lever, so that the bell hammer snaps back into place and rings the bell before the operation of the key is completed. When the key is released, the two triggers are allowed to return past the bell crank levers by the "flipping up" of the followers. The mode of operation is exactly the same at both ends of the machine.

Now, this feature of "disconnection" is not referred to in the first claim or emphasized in the specification; but in any case it was an old and familiar mode of operation of such mechanism. *Precisely* this operation was shown in all the prior patents where a bell was rung. For example, in patent to Windmüller and Ahrens, the arm I, with its follower, "disconnects" with the bell hammer during the operation of the key, thereby allowing the bell hammer to be pulled back by its spring. So in the patent to Howie, the spring pawl H and its trip *h* disconnect with the hammer I; and in the Capron patent, the lever *i* disconnects with the follower *l*, upon the bell hammer *k*. In all three cases, the hammer is pulled back by its spring during the operation of a key, and the trip or "follower" subsequently permits the "connecting mechanism" to return to place past the bell hammer

lever. In fact, this was the common mode of construction in all machines where a train of devices was used to actuate a moving device which was to be returned to place by a spring during the depression of the key, instead of being allowed gradually to return as the key was released and the "connecting mechanism" thereby resumed its place. Such mode of operation certainly gives no claim to novelty to the connecting mechanism of Ritty and Birch.

It is not necessary however, to dwell on this feature, because Mr. Renwick admits (Cross-Int. 13, p. 101) that "*mechanism substantially like plaintiff's connecting mechanism was substantially old.*"

Summary of Argument as to "Connecting Mechanism."

Complainant's position is that "supporting wing," in the first claim here in issue, covers "sliding bar," and that therefore the four specified elements of the claim were old in combination; that the words "with connecting mechanism" refer to the only novelty in the combination, namely, "a single connecting mechanism" between the keys and the wing, and that the purpose of this mechanism is to push the wing further back than the detent of the rod would do, so as to cause the sure release of the previously raised rod; that this is a "pioneer invention" and is therefore infringed by defendants, although they do not use either the supporting device specified in the claim, nor the form of what plaintiff calls "connecting mechanism" described in the patent.

The answers to this argument are numerous and conclusive. We sum up what we have said before: —

1. The language of the claim and the description of the specification are plain and unambiguous, and refer definitely to a *wing*; and plaintiff's interpretation violates a "fair interpretation" of the patent.

2. It is admitted by Mr. Renwick that the result which he ascribes to the Ritty and Birch invention is old; and it is

abundantly shown that several prior patents achieve the same result, and two of them by mechanism closely resembling that of the patent in suit. It is plain, therefore, that this claim cannot be "broadly" construed (in other words, perverted from its fair interpretation), to cover defendant's device.

3. The phrase "connecting mechanism" is nowhere used in the patent of the train of actuating devices so denominated by complainant. The words are vaguely used only in the first and fifth claims, being there used in different meanings, and, obviously, are not intended to refer to *the* important feature of either claim.

4. The object of the combination of the first claim is fully set forth therein. It is *not* the release of a previously raised key, by pushing back the wing further than the detent would push it, but is the yielding of the wing to allow the passage of the rod, and its subsequent reëngagement therewith. All the "connecting mechanism" which is necessary for this result is the pivot of the wing and the spring which actuates it, while "connecting mechanism," as interpreted by complainant, is wholly unnecessary.

5. Ritty and Birch used a train of "connecting mechanism" to actuate a bell hammer and to help move the supporting wing. Similar "connecting mechanism," broadly speaking, consisting of a common bar over or under the keys and actuating devices connected therewith (which is all that defendants' machine has in common with complainant's on this point), had been frequently used in cash registers and cognate machines to actuate bell hammers, drawer holders and other devices.

It is impossible for plaintiff to patent, broadly, the use for one purpose (namely, moving the supporting wing) of a mechanism which was used, at the other end of his own machine and in the prior art, for another purpose (namely, moving a bell hammer). Especially is this true when the result of the alleged combination was admittedly old.

Complainant's Theory of the Law of this Case.

As we have said, the only difference between complainant's invention, as interpreted by Mr. Renwick, and the prior art is that there is a single connecting mechanism between the series of keys and the supporting device, instead of having each key separately connected with that device. The Pottin contrivance attains the same result: and the only advantage of the supposed Ritty and Birch invention is in simplicity.

Now, it had long been known that when any object was to be moved by any one of the series of keys, that each key could be connected separately with that device, or there could be used a *single common bar* extending over all the keys, which bar would operate the device to be moved.

Ritty and Birch (it is admitted) found such a single connecting mechanism at hand for ringing their bell, and that same mechanism (as their patent shows) was equally available for moving the supporting wing. Ritty and Birch's *specific* connecting mechanism is new. This they claim in Claims 4 and 5; and nobody contends that defendants infringe these claims.

The legal theory upon which complainant presents this case is very remarkable. It is fully admitted that the combination of the four elements of keys, rods, tablets and supporting device was old, and that, furthermore, a single connecting mechanism substantially like plaintiff's, between a series of keys and an object to be moved, was old; but Mr. Renwick's and complainant's contention is that no machine is a reference for the Ritty and Birch patent which does not show combined together every element of the first claim as they construe it.

Mr. Renwick sums up the matter as follows, at the close of his cross examination (Cross-Int. 13, p. 101): —

"Now, *supposing that all the elements of the plaintiff's first claim, or their equivalents or substitutes, except the connecting mechanism, were old and combined in the same way as in plaintiff's patent* [which he has said is the fact], *and suppose that mechanism, substantially like plaintiff's connecting mechanism, were, as is the case, substantially old*, for the purpose of ringing a bell when any one of a series of keys was struck, then I should be confident that Ritty and Birch had made an invention when they conceived the idea of moving a wing or rod to a greater distance than it could be moved by shoulders on the rods, so as to permit the rods to drop with certainty [he has just said that this result was old], and had, in carrying out that idea, combined this connecting mechanism with a wing or supporting bar and tablets and shoulders, *all old*, so as to produce the desired result."

He next expressly admitted that *the mode of operation of the connecting mechanism was substantially the same in the prior art as in plaintiff's patent:* —

"*Cross-Int.* 14. So far as the operation of the connecting mechanism is concerned, did it work any differently when used to push back the wing than it did when used to push back the lever on a bell hammer?

"*Ans.* No, not when considered alone and by itself; but in the one case it operated to ring a bell, and in the other to let tablet rods fall; because in the one case the connecting mechanism was combined with the hammer of a bell, and in the other with a wing or bar which would support any one of a number of tablet rods."

Mr. Renwick had previously summed up his position in Cross-Int. 10, p. 100, where he says that a prior patent, in order to have anything to do with the construction of that claim, "must show every element there enumerated, or equivalents or substitutes for each of such elements."

In short, complainant's position, through Mr. Renwick, is clear. He admits that every element of the claim, as interpreted by him, except the "connecting mechanism," was old; he admits that "connecting mechanism" which operated in substantially the same way was old in machines of

this class (though used to move a different object). He admits that the result of the combination, namely, to release a previously raised tablet rod with certainty, was old. *But he claims that it was an invention to use "a single connecting mechanism" between the keys and supporting bar of an old machine, although the old connecting mechanism was not even modified for that use, although the result of the combination was old, and although precisely the same train of mechanism was used in the old way on the other side of the machine for ringing a bell.* In short, the position is that it was a "pioneer invention" to use in an old machine an old actuating mechanism, because it was used to move a different object, — although such use was for precisely the same purpose as of old, namely, to save the use of repeated mechanisms for accomplishing the same result.

If complainant's law, as expounded by Mr. Renwick, is correct, then every decision of this Court which proceeds on the ground of what is sometimes called "double use" is erroneous. For all that line of cases proceeds, not upon the ground of direct anticipation, but upon the ground that it is not invention to combine with an old machine a device not previously used with that machine, but used in other combinations where it operated in like manner.

Citation of Cases Bearing upon "Double Use."

A case very analogous to that at bar is *Aron* vs. *Manhattan Railway Co.*, 132 U. S. 84.

The specification described as the invention, mechanism whereby the attendant on a railway train could open and shut the two gates upon the platforms of two adjoining cars simultaneously. The specification described specific means for doing this. Each of the first five claims in issue was for the combination *with the gates upon a car platform*, of means for opening and shutting the gates, these means being claimed more or less broadly in the different claims. Prior

patents were cited which showed means for closing the doors to street cars at a distance, for closing transoms, and for closing outside blinds.

This Court, speaking by Mr. Justice Blatchford, adopted the opinion of Judge Wallace, in which it is said: "A brief reference to the prior state of the art will indicate that *the combinations referred to in the several claims are merely an application to a new situation of old devices which had been previously applied to analogous uses.*" (Page 88.) "This partial exhibit of the prior state of the art demonstrates that what the patentee did was to adapt well-known devices to the special purpose to which he contemplated their application. . . . The new situation required adequate modifications of existing devices for opening and closing an aperture at a distance from the operator, appropriate to the new occasion." (Page 89.) "The patentee is entitled to the merit of being *the first to conceive of the convenience and utility of a gate opening and closing mechanism* which could be operated efficiently by an attendant, in the new situation. *His right to a patent, however, must rest upon the novelty of the means he contrives to carry his idea into practical application.*" (Page 90.) Accordingly, the bill was dismissed for want of patentable invention.

We believe that this case is absolutely indistinguishable from the case at bar; and it shows especially Mr. Renwick's mistake in taking the position that the patents cited by defendants are irrelevant, because, although they showed a connecting mechanism "substantially like that of the patent" and "operating in the same way," that connecting mechanism was not used to move a supporting device; for, in the case above cited, means for moving objects at a distance had never before been combined *with railway gates*. Moreover, the case of Aron was stronger than plaintiff's case here: for it was necessary for him to make alterations in the mechanism previously used, to adapt it to its new situation; whereas, in the case at bar, the connecting mechanism was

adapted to move the supporting wing *in the same form in which it had been used to actuate a bell.* It is obvious, therefore, that this decision is conclusive in this case.

In *Wollensak* vs. *Sargent*, 151 U. S. 221, 227, this Court says: —

> "The novelty must be a novelty in the means or mechanical device, and not in the use to which the combination is put."

See also,

Miller vs. *Eagle Mfg. Co.*, 151 U. S. 186, 201.

In the recent case of *Ansonia* vs. *Electrical Supply Co.*, 144 U. S. 11, 18, this Court cites the leading case of *Pennsylvania Railway* vs. *Locomotive Truck Co.*, 110 U. S. 490, 494, where it was held that, —

> "The application of an old process or machine to a similar or analogous subject, with no change in the manner of application, and no result substantially distinct in its nature, will not sustain a patent, even if the new form of result had not before been contemplated."

And the Court cites numerous cases where this principle has been followed.

Certainly, to apply this principle to the case at bar, the application of the old connecting mechanism to a similar or analogous subject (namely, moving a wing instead of a bell hammer), with no change in the manner of application, and no result substantially distinct in its nature, will not sustain a patent; in fact, in this case, the *result* had been directly anticipated by Pottin.

For other recent cases laying down this principle, see

St. Germain vs. *Brunswick*, 135 U. S. 227, 231.

Howe Machine Co. vs. *National Needle Co.*, 134 U. S. 388, 397.

Royer vs. *Roth*, 132 U. S. 201, 206.

Blake vs. *San Francisco*, 113 U. S. 679, 682.

These decisions of this Court (which could, of course, be greatly increased in number) show that plaintiff's contention, that because the well-known single connecting mechanism had not been used before Ritty and Birch to move the supporting device, therefore such use was broadly patentable, is wholly unfounded.

The broad invention of "a single connecting mechanism" was made, as we have said, once for all by the first man who used a common bar with a series of keys to move any object in the machine. Confessedly, this connecting mechanism had been used frequently before Ritty and Birch to ring a bell, to move a carriage, to open a drawer, and to actuate a register. The claim that Ritty and Birch can patent the use of that mechanism for attaining the old result of moving the supporting bar the required distance seems to us directly in the face of many well-considered decisions of this Court.

The same principle is found in the numerous decisions of this Court on the subject of "aggregations." If one old element is combined with other old elements, each operating in its old manner, then there is no patentable invention, though the combination be new and the machine be better than previous ones (which last is more than is shown in the case at bar).

An often quoted case upon this point is *Thatcher Heating Co.* vs. *Burtis*, 121 U. S. 286. Before the patent in suit, the fuel magazine had never been combined with a fireplace heater, but it had been used in an outstanding base-burning stove (page 294). The Court held the patent not to be valid, saying, —

> "It is true that such a fireplace heater, by reason of the fuel magazine, was a better heater than before, just as the outstanding stove with its similar fuel magazine was a better heater than a similar stove without such a fuel magazine; but the improvement in the fireplace heater was the result merely of the single change produced by the introduction of the fuel magazine, — but one element in the combination."

The Court goes on to say that if the adaptation of these elements to each other required the invention of means for arranging the parts, this might be patentable; but that here the claim is made for the combination, no matter how or by what means it is effected, and that such claim cannot be sustained.

This decision seems exactly applicable to the case at bar.

So, also, in the recent case of *Union Edge Setter Co.* vs. *Keith*, 139 U. S. 530, 538, it appeared that the patentee

> "was the first to use a burnishing tool having a guard, in connection with a finger rest, and that his machine is probably superior to other devices of like design; but as all of these elements were old and no new function is performed by the combination, it is a case of mere aggregation, which, it is well settled, is not patentable."

In *Florsheim* vs. *Schilling*, 137 U. S. 64, 77, the new combination of old elements in the patented corset made "a superior and cheaper article." But the Court held that there was no patentable invention, and said (quoting from *Pickering* vs. *McCullough*, 104 U. S. 310, 318, and *Burt* vs. *Evory*, 133 U. S. 349, 358): —

> "In a patentable combination of old elements all the constituents must so enter into it as that each qualifies every other. . . . It must form either a new machine of a distinct character and function, or produce a result due to the joint and co-operating action of all the elements; and which is not the mere adding together of separate contributions. The combination of old devices into a new article, without producing any new mode of operation, is not invention."

To the same effect are *Adams* vs. *Bellaire Stamping Co.*, 141 U. S. 539, 542; *Brinkerhoff* vs. *Aloe*, 146 U. S. 515, 516, and numerous other cases cited in these opinions.

These cases are directly applicable to the case at bar, where the claim, as interpreted by complainant, consists of a combination of five old elements producing absolutely no new result over the old machines, — which had a separate

connecting mechanism from each key to the supporting bar instead of a single mechanism, — in which combination, moreover, each element acts as it had done before, as is fully admitted by Mr. Renwick.

A Pretended New Result of Ritty and Birch.

Neither the Ritty and Birch patent nor the testimony in this case lays claim to any new result for complainant's patent. Indeed, the specification of the patent says (as already quoted by us) that the result was old and that the novelty of the invention consisted in the mechanism employed.

Even more significant is the fact that complainant's accomplished expert, Mr. Renwick, was unable to find any new result in the patented machine, and expressly testified upon cross examination, in two successive depositions (Cross-Ints. 5–8, p. 69; Cross-Int. 9, p. 100), *that the Ritty and Birch patent "does not effect a new result."* There would, therefore, seem to be no room for question upon this point.

At the argument in the Court below, however, plaintiff's counsel found it necessary to have some "new result" in the Ritty and Birch machine in order to support their claim to "a pioneer invention." Consequently, they advanced the argument that it was a new feature with Ritty and Birch, and a direct result of their use of "connecting mechanism," that if two keys had been operated together, the subsequent operation of only one of those two keys would release the tablet belonging to the other key. It was represented that this feature was of the highest consequence, that it was due to the use of a single connecting mechanism, and that any machine was therefore "worthless" without such mechanism.

We show below that this claim is not substantiated by the facts; but, furthermore, *it surely will not be considered by the Court upon this Record.* The defendants have had no opportunity to take testimony on this point and to show, as was easy, that "connecting mechanism" is *not* necessary to

accomplish this alleged important result; that, as a matter of fact, prior machines had effected the same result; and that, moreover, this feature is of no consequence in defendants' machine.

We submit that this Court will not consider the claim of novelty advanced under such circumstances without any support in the Record.

More especially is this the case where the patent is absolutely silent as to any such mode of operation. In fact, it expressly appears that all that the patentees are concerned with is the operation of *one key* and the elevation of its tablet rod, and then the release of that tablet rod upon the operation of *a different key*.

In describing the operation, the patent says (page 110): —

> "It is an important feature of our machine that after a key has been operated, and its tablet rod exposed to view, such tablet shall remain up and exposed until another key is operated; whereupon the first falls back out of view and the second remains exposed, and so on, thus always keeping in view the tablet of the key last operated.

And, again (page 112), —

> "Whenever the same key is successively operated, its rod and tablet remain up and exposed to view; but when a different key is operated, the tablet of the previous one is released and falls back out of sight, and the tablet of the operated key remains up and exposed."

Here is certainly no suggestion of operating two keys at once, and subsequently only one of the same two keys.

We submit that this Court will take no notice of such an after-thought of counsel, which is not supported by the patent, and is negatived by complainant's own testimony.

In the recent case of *Ball & Socket Fastener Co.* v. *Kraetzer*, 150 U. S. 111, 116, it was claimed that a certain advantageous result was produced by the patent in suit, which also was found in defendant's contrivance. This Court held that there was no infringement, saying, —

> "*If this feature be an advantage, as now claimed, it is strange that no allusion is made to it in the specifications; and in his testimony, the patentee stated directly* that in describing his invention as set forth in his patent, in the attachment of the fastener to the fabric, he did not contemplate any stretching of the leather, or that the hole in the fabric should be of any particular size, or any other effect than is produced when two parts are fastened together by an eyelet. . . . *This would indicate that the advantage now claimed of a tighter compression of the leather was not originally within the contemplation of the patentee, but is an afterthought suggested by his inability to make out a case against the defendant of an infringement of the spring portion of the socket.*"

So, also, in *Union Edge Setter Co.* vs. *Keith*, 139 U. S. 530, 539, the patent was for an aggregation of old elements; and counsel for the plaintiff, as here, "made a most ingenious argument to show that a new function is performed by the combination." But this Court held: —

> "If any separate function had been performed by this combination, *it is somewhat singular that the patentee did not call attention to it in his original application*, or until after the main feature of his patent was shown to have been anticipated."

So, also, in *Western Electric Co.* vs. *Ansonia Co.*, 114 U. S. 447, 452, this Court held that a patent could not be supported for a feature of the patentee's process which was not expressly described in the specification and claims.

In *Stutz* vs. *Robson*, 54 Fed. Rep. 506, 508, Judges Acheson and Buffington held that the patent was invalid, saying, —

> "The plaintiff, indeed, testifies that his machine possesses a special advantage . . . but *there is no hint in the specification of any such advantage or function*, and the plaintiff cannot read into his claim a sulphur deposit chamber."

See, to the same effect,

Stirrat vs. *Excelsior Mfg. Co.*, 60 Fed. Rep. 607, 609 (affirmed on appeal, 61 Fed. Rep. 980).

Gunn vs. *Savage*, 30 Fed. Rep. 366, 369.

Tinker vs. *Wilber Mfg. Co.*, 1 Fed. Rep. 138, 139.

This supposed advantage was first presented at the hearing. Defendants have had no opportunity to take testimony about it. The following considerations, however, seem conclusive against complainant's position.

1. *We have no reason to suppose that this feature is of any practical importance*, for it very seldom happens that two keys are operated together, as such machines are mostly used for recording small sums under one dollar, and Ritty and Birch have a separate key for each such sum.

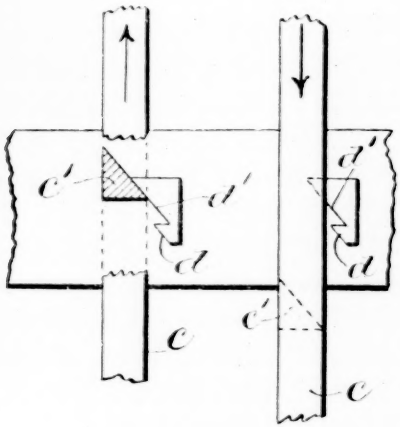
2. We could also have shown, if this point had been raised upon the record, that in defendants' machines, as they have always been constructed and put upon the market, there are special devices (as to which complainant and defendants have been in interference in the Patent Office) *to prevent two keys of the same bank from being actuated simultaneously*. Now, each bank of keys in defendants' machine has its own connecting and adding mechanism, and is therefore, as both complainant's experts expressly state, "practically two machines, one for cents and one for dollars, each machine having its independent adding mechanism." (See, page 12; Renwick, p. 65). Inasmuch as two keys in either bank, which have a common "connecting mechanism," *cannot* be depressed, the pretended advantage of complainant's structure would be utterly worthless in defendants' machine as made for the market.

3. As a matter of fact, this accidental feature of operation of Ritty and Birch's machine is *not in any way due to the use of a "single connecting mechanism"* between keys and supporting device, as complainant's counsel have represented. It is not even a new result.

It does so happen that in the prior Pottin patent, the elbows on the rods, which operate the sliding bar, remain above the devices which they engage to operate the bar; and, therefore, if two keys are operated, and then one of the same keys be operated, it will not move the bar, and both tablets will remain exposed.

But in the Campbell patent, if two keys are operated simultaneously so that two tablets remain exposed, the subsequent operation of one of those keys will cause the tablet to press its corresponding hook and the supporting bar to the left (as explained above); and the other tablet will drop. We have had no opportunity to offer testimony expressly directed to this point; but it is obvious that such will be the mode of operation.

So, also, the Hardy patent effected the same result by its different mechanism. If two keys are simultaneously



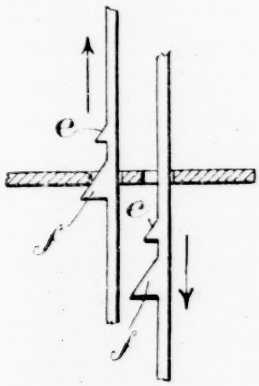
First Example of Individual Connections.

operated and bring up two tablets in sight, the subsequent operation of only one key will drop both tablets and then expose only the one corresponding to the key which is pulled. Of this there can be no question.

But apart from the prior patents in evidence, it is plain that a "single connecting mechanism" is *not* necessary to effect this alleged result. The annexed diagrams show two constructions without such "connecting mechanism" which plainly attain this result. One rod is represented as rising to its highest point, the other as falling.

In the first a cam c', upon each rod c, engages a double

cam d d' upon the supporting bar. When any rod rises, its cam first pushes aside the lower supporting cam d, and then, moving further upwards, pushes aside the upper and larger cam d', until any previously raised rod is surely released by its supporting cam d, after which the supporting bar is moved back by its spring, and the cam c' of the rod last raised is supported by cam d. If two rods had been raised, the subsequent operation of the key of only one would thus release the other rod.



Second Example of Individual Connections.

So, also (as is shown in the second diagram), there could be two cams, e, f, upon each tablet rod, the upper and smaller holding the tablet rod raised, while the lower and larger pushes the supporting bar so far aside as to release any previously raised tablet rod. Thus, if two rods have been elevated, the subsequent operation of the key of only one of them will release the other rod by the action of the cam f.

These two constructions are shown in issued cash register patents, but we have had no occasion to put them in evidence upon this Record.

It follows, then, that this supposed and very flimsy distinction between Ritty and Birch and Pottin does not depend

in the least on the employment of "a single connecting mechanism"; but can be just as well attained by moving the support by a projection on each rod, — the only essential being that the actuating shoulder on the rod shall be held below the projection of the sliding bar which it pushes aside to release other rods; and this was the operation of the Campbell patent. We believe that this point requires no further discussion.

Supposed Demand for the Complainant's Machine.

Complainant may refer to the testimony of Mr. Patterson, vice-president of the complainant company, to the effect that the company has made and sold large numbers of machines "embodying the Ritty and Birch invention" (Ints. 4, 5, p. 90). His testimony makes it doubtful whether they really did embody it; for he admits they departed from what is shown and described in the patent (Int. 18, p. 92; Int. 23, p. 93).

In any case his testimony does *not* show that it was the Ritty and Birch invention which made the "National Cash Register" go into use. For he did *not* say that the sale was due to the use of that invention (which is the only material point); and, on cross examination, admitted (Cross-Ints. 27, 28, p. 94) that numerous other inventions owned by the company were embodied in the National Machine. The reason why the machine was sold is explained by him in Int. 7, p. 90. He says that when the National Machine went on to the market, —

> "It was an entirely new industry, and *the larger part of the labor and expense of our company for a number of years was directed toward advertising the machines and creating a demand for them.* When we attempted to introduce the machines, we encountered a strong prejudice against them on the part of those who were required to use them, *as they considered it a reflection upon their honesty.* We had great difficulty in overcoming this prejudice and selling our machines at all."

In short, Mr. Patterson's testimony is not that prior machines were defective, and that the Ritty and Birch invention overcame that defect and created a demand for the machine (which testimony would have some relevancy, if the question in this case were that of patentability); he does not deny that the Pottin machine was a perfectly good machine, and explains that prior machines had not been used because of a prejudice against such machines, and that the National Company got their machine on the market by persistent advertising and other commercial efforts. This is to the credit of the energy and business enterprise of the complainant company, but has no tendency to strengthen the Ritty and Birch patent and enable complainant to enlarge its scope beyond its plain meaning.

This Court has often called attention to the care with which evidence of large sales must be received, and to the fact that such evidence, even if satisfactory, is *never* relevant on the question of *patentability*, but only of utility.

In *Krementz* vs. *S. Cottle Co.*, 148 U. S. 556, 560, this Court said: —

> "The argument drawn from the commercial success of a patented article is not always to be relied on. Other causes, *such as the enterprise of the vendors and the resort to lavish expenditures in advertising*, may co-operate to promote a large marketable demand."

The fullest warning which this Court has given upon this point is in *McClain* vs. *Ortmayer*, 141 U. S. 419, 428, where the Court said: —

> "That the extent to which a patented device has gone into use is an unsafe criterion even of its actual utility is evident from the fact that the general introduction of manufactured articles is as often effected by *extensive and judicious advertising, activity in putting the goods upon the market* and large commissions to dealers, as from the intrinsic merit of the articles themselves. . . . If the generality of sales were made the test of patentability, it would result that a person, by securing a patent upon some trifling variation from previously

known methods, might, by energy in pushing sales, or by superiority in finishing or decorating his goods, drive competitors out of the market and secure a practical monopoly, without, in fact, having made the slightest contribution of value to the useful arts. The very case under consideration is not barren of testimony that the great success of the McClain pads and clasping hooks — a large demand for which seems to have arisen and increased year by year — is due, partly at least, to the fact that he was the only one who made the manufacture of sweat-pads a specialty: that he made them of a superior quality, advertised them in the most extensive and attractive manner, and adopted means of pushing them upon the market, and thereby largely increased the extent of their sales. Indeed, it is impossible from this testimony to say how far the large sales of these pads is due to their superiority to others, or to the energy with which they were forced upon the market."

The Court continues to say: —

"While this Court has held in a number of cases that, in a doubtful case, the fact that a patented article had gone into general use is evidence of its utility, *it is not conclusive even of that — much less of its patentable novelty.*"

So, also, in *Adams* vs. *Bellaire Stamping Co.*, 141 U. S. 539, 542, this Court held: —

"Nor, under the circumstances, did the Court err in declining to instruct the jury that the fact that the Irwin lantern had practically superseded all others was strong evidence of its novelty. The question before the Court upon the main issue was not of the novelty of the invention but rather of its patentable character. Where there is no invention, the extent of the use is not a matter of moment."

In *Grant* vs. *Walter*, 148 U. S. 547, 556, this Court held: —

"The fact that the patented article has gone into general use is evidence of its utility, but not conclusive of that and still less of its patentable novelty."

See, to the same effect,

Olin vs. *Timken*, 69 Off. Gaz. 1361, 1365.

Duer vs. *Corbin Cabinet Lock Co.*, 149 U. S. 216, 223.

Hat Pouncing Machine Co. vs. *Hedden*, 148 U. S. 482, 490.

Lovell Mfg. Co. vs. *Carey*, 147 U. S. 623, 635.

Saunders vs. *Allen*, 60 Fed. Rep. 610, 612 (Court of Appeals, Second Circuit).

Fox vs. *Perkins*, 52 Fed. Rep. 205, 213 (Court of Appeals, Sixth Circuit).

Thus it plainly appears that even if complainant had introduced in this case — which it has not — evidence of the popularity of the Ritty and Birch invention, it would only be evidence on the subject of utility, not of patentability. In this case, the only question between the two parties is that of infringement, and of the construction of the patent as bearing upon that question. The Circuit Court of Appeals for the First Circuit has well said that evidence of wide sales is wholly irrelevant on this point: —

DeLoriea vs. *Whitney*, 63 Fed. Rep. 611, 621.

> "The appellants rely on the fact that the patented machine was the first successful one, and on the fact that it had great commercial success. The decisions touching the effect of these propositions are so numerous and modern that they need not be referred to specifically, but they limit the application of them to doubtful cases turning on the question of utility or patentable invention. *They have no pertinency to cases which turn on the construction of the patent.* We think no well-authenticated case can be found where they have been admitted with reference to such issues."

We therefore submit that the alleged wide sale of complainant's machine is wholly irrelevant on every account.

The Decisions on the Ritty and Birch Patent.

We submit that Judge Colt's decision (page 215) is plainly correct. The substance of the decision is that, in view of the prior state of the art, Ritty and Birch must be confined to the mechanism which they describe, or equivalent contrivances; and that defendants do not use the peculiar features of the Ritty and Birch patent.

The Ritty and Birch patent afterwards came before Judge Acheson of New Jersey, in a case against another defendant — The American Cash Register Company. As this defendant was in no way privy to that suit, and a different machine was involved as an infringement, the decision cannot be of any importance here. The case was presented by other counsel upon a different Record from that here presented. But as it may be cited by complainant, brief mention of the same is advisable.

The opinion (47 Fed. Rep. 212) contains several serious errors of fact, and it would seem that defendant's case was not as fully presented as in the case at bar. For example, the Court speaks (page 213) of the keys, shouldered tablet rods, and wing yieldingly held against the tablet rods by a spring, so that any rod may press back the wing, after which the wing is moved forward by its spring; and then says that, —

> "Everything thus far described had existed in some form or other in machines of this class before the date of the Ritty and Birch invention.

This is not true, as far as the Record in *this* suit is concerned; for no such wing operating in this manner is shown in the prior art, as above explained. If this combination were found, it would anticipate everything set forth in Ritty and Birch's first claim. The Court then (page 214) speaks of the importance of dropping a previously raised tablet rod, as if this result were due to the use of the train of "connecting mechanism," which is an absolute error. In fact, the Court

proceeds to admit reluctantly: "It must be conceded that previously means had been employed" (*i. e.*, those of Pottin) for the same purpose. The Court then says that Ritty and Birch achieved a "new result" by moving the supporting bar by the operation of a key whose tablet rod is already up, so that if two tablets were up one could be dropped: and attributes this alleged result to the "connecting mechanism." But we have already pointed out that this supposed result (which is not mentioned in the Record in *this* case), is not due to the connecting mechanism, and can be just as well achieved by separate mechanism with each key, and was, in fact, achieved by Campbell.

So far as the opinion shows, Judge Acheson's attention was not called to prior patents showing the use of "connecting mechanism" operating in the same way as complainant's.

It appears that defendants' machine in the other case had a supporting device which moved to and from the row of tablet rods, as in the Ritty and Birch patent (instead of sliding transversely along the row, as in these defendants' machine). It was pushed away from the rods by a bell crank lever, as in plaintiff's patent. As the Court says (page 216), this transverse supporting bar had "substantially the same mode of operation" as the supporting wing of the patent.

Furthermore, it appeared that in defendants' machine the elbow on the rod, as well as the connecting mechanism, moved back the supporting bar, just as described in the Ritty and Birch patent.

The defendants' machine in *this* case is obviously different from the one before Judge Acheson, as it has neither of these essential features of the Ritty and Birch patent, and Judge Acheson said (page 217), in considering Judge Colt's decision: —

> "There are obvious differences between it and the machine of the present defendant."

The Court held that it did not "intend to intimate a doubt" of the correctness of Judge Colt's decision.

We believe that Judge Acheson would not have taken the same view of the value of the Ritty and Birch patent upon the Record here presented; and, in any case, the decision as to the scope of the patent does not touch the case at bar.

Complainant's counsel may further refer to the decision of the Court of Appeals of the Third Circuit in *National Cash Register Co.* vs. *American Cash Register Co.*, 53 Fed. Rep. 367, in which the Campbell patent was sued upon. As this complainant also sued the present defendants, appellees, upon the same Campbell patent, in which suit defendants were held by Judge Colt not to infringe: and as complainant, after taking an appeal to this Court, from that decision, subsequently voluntarily dismissed that appeal (as the docket of this Court shows), — complainant is plainly estopped to question the correctness of Judge Colt's decision on the Campbell patent as against this defendant.

But, furthermore, there is nothing in this decision of the Court of Appeals which has any bearing upon this case. It is based upon the ground (page 372) that

> "Campbell's invention was a primary one. The proofs abundantly establish that *he was the first person who succeeded in effecting, in any manner or form whatever*, the opening of an automatically locked cash drawer in a cash registering apparatus, upon the operation of any one or other of the keys of its series. In doing this he did not merely improve upon something which had been done before. What he produced was absolutely and distinctly new. . . . He was a pioneer."

Now this is absolutely inapplicable to the case at bar, where it is conceded that the actuation of a supporting device in a cash registering apparatus upon the operation of any one of the keys was old long before Ritty and Birch. All they did (as Mr. Renwick expressly says) was to achieve an old result by different mechanism.

The decision of Judge Colt must be reviewed *upon the Record in this case;* and we submit that his decision was plainly correct.

Conclusion.

We submit, with confidence, that the Ritty and Birch patent is a small improvement upon prior machines of the same class to effect the same result; that defendants' machine uses nothing described in the specification or claimed in the first claim of that patent, which was novel with the patentees; and that the decision of the Court below must be affirmed.

FREDERICK P. FISH,
W. K. RICHARDSON,
of Counsel for Defendants.

Office Supreme Court, U. S.
FILED.
JAN 14 1895
JAMES H. McKENNEY,
CLERK.

156-502

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1894.

No. 155.

THE NATIONAL CASH REGISTER COMPANY,

Complainant, Appellant,

vs.

THE BOSTON CASH INDICATOR AND RECORDER COMPANY AND JAMES H. WRIGHT,

President, Defendants, Appellees.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF MASSACHUSETTS.

BRIEF FOR DEFENDANTS IN ANSWER TO COMPLAINANT'S BRIEF.

FREDERICK P. FISH,
W. K. RICHARDSON,
of Counsel for Defendants.

Supreme Court of the United States.

OCTOBER TERM, 1894.

No. 155.

THE NATIONAL CASH REGISTER COMPANY,
Complainant, Appellant,
vs.
THE BOSTON CASH INDICATOR AND RECORDER COMPANY AND JAMES H. WRIGHT,
President, Defendants, Appellees.

BRIEF FOR DEFENDANTS IN ANSWER TO COMPLAINANT'S BRIEF.

If complainant's brief argued the case upon the record transmitted to this Court from the Circuit Court, we should rest upon our brief already filed. But we must make a short reply to complainant's brief, because we note therein many fundamental statements which find no support in the record, some of which, moreover, are contradicted by complainant's own testimony.

We shall also call attention to some erroneous legal propositions advanced by complainant.

I.

It is elementary that this Court will decide the case upon the record which was before the Court below: even affidavits filed in the same case upon motion for re-hearing will never be considered.

In *Russell* v. *Southard*, 12 How. 139, 159, this Court held: —

> "This Court must affirm or reverse upon the case as it appears in the Record. We cannot look out of it for

testimony to influence the judgment of this Court sitting as an appellate tribunal."

In *Pacific Railroad* v. *Ketchum*, 95 U. S. 1, 3, this Court held: —

> "Appeals in equity are heard upon the pleadings and proofs below. No new evidence can be admitted, and the pleadings cannot be amended in this Court."

See, to the same effect, —

Boone v. *Childs*, 10 Pet. 177, 208;
Thomson v. *Wooster*, 114 U. S. 104, 117.
Hoskin v. *Fisher*, 125 U. S. 217, 221, 223;

A striking feature in complainant's brief is its careful avoidance of the complainant's patent and of the Record. That part of the brief which describes the invention and contrasts it with the state of the art (pp. 9–32) does not once refer to the language of the Ritty and Birch specification. Indeed, the specification is referred to only in the latter part of their brief; and that only in connection with one point of the case.

Again, complainant, who called Mr. See and Mr. Renwick as experts to testify to the invention described in complainant's patent and its relation to the prior art, only refers *once* in its entire brief (at p. 49) to the testimony of its own experts upon these points, although it is stated on the same page that "Mr. Renwick is well known to this Court and has perhaps had a longer and larger experience as a mechanical expert than any other man in the United States."

The reason why complainant does not refer to the testimony of its own distinguished experts is made obvious by our brief. They not only fail to support complainant's present argument, but expressly contradict it.

In short, the complainant's brief might not be remarkable in having little reference to the patent sued upon (for that is not uncommon in patent causes); but it *is* remarkable in

arguing the case without reference to the elaborate testimony given by its own experts.

We furthermore desire to notice that **complainant has entirely failed to meet the two main contentions which we make in this Court, and made in the Court below,** namely, that complainant's construction of Claim 1 contradicts both the terms of the claim and the description of the specification; and, second, that the claim, if so construed, would cover a mere unpatentable aggregation.

II.

One fundamental error underlies all complainant's brief from beginning to end. Instead of relying upon testimony in this record, it relies upon the findings of fact in another case of the Circuit Court of New Jersey as to the scope and value of the Ritty and Birch patent. We have pointed out in our brief (pages 92, 93) that this opinion contains a number of errors, and that a different machine was there in issue as an infringement, as the opinion points out.

The suit was between different parties, and was presented on a different record. *That record is not before this Court*, and there is no reason for presuming that the prior state of the art was fully presented, or that the case was adequately argued to the Circuit Court. The opinion, if that can be regarded as evidence before this Court, does not show what prior patents had been put in evidence, or that any prior patents showing "a common connecting mechanism" were called to the attention of the Court.

We submit that the case at bar must be decided upon the record before this Court; and that the decision of this Court cannot be influenced by the findings of fact of a Circuit Court upon a different record. Complainant's brief throughout attempts to use this opinion *in place of testimony*.

Complainant also endeavors (pp. 96–101) to call the attention of this Court to the Opinion of Judge Colt upon the

Campbell patent, in another suit between these parties, and the contrary opinion of the Circuit Court of Appeals of New Jersey in a suit on this patent against another defendant.

We cannot believe that complainant is in any position to gain anything from this argument. Complainant, as we have stated in our brief, took an appeal to this Court (No. 156 on this docket) from Judge Colt's decision on the Campbell patent.

The files of this court will show that, upon the complainant's failure to print the record on that appeal, defendants sent a check to the clerk, and directed that the record should be printed; and that, shortly after this, complainant, appellant, without notice to the defendants, appeared in this court and dismissed its appeal. Defendants desired to argue that appeal, believing that the decision of the Court of Appeals in New Jersey was clearly wrong and that this Court would confirm Judge Colt. That complainant's counsel should dismiss the appeal on that patent, and then incorporate in their brief in this case the opinion of the Court of Appeals and an argument against Judge Colt's opinion upon the Campbell patent, is a proceeding which we leave to this Court without further comment.

III.

The leading errors in complainant's brief may be briefly stated seriatim, as follows:

1. It is *assumed* without discussion throughout the brief that there are five elements in the first claim, the fifth of which is "a connecting mechanism between the keys and supporting wing."

Complainant admits that the combination without such train of mechanism "would be amply sufficient for the purpose of automatically catching and holding up the lifted rod" (this is expressly stated, for example, on page 12 and page 82), whereas the utility of the "connecting mechanism," as

that phrase is misinterpreted by complainant, is constantly stated to be that it secures the release of a previously raised rod. (See pages 16–18.)

But complainant wholly omits to notice, that the claim here in controversy carefully defines the combination claimed by its result, and that this described result is simply *the holding up of the tablet rod and not its release*. Complainant's interpretation of the claim leaves it inoperative for the purpose set forth; and there is no foundation in the specification or anywhere else for such forced interpretation. The matter is fully treated in our brief (pp. 23–31).

Complainant's brief is founded upon this fundamental error.

Complainant on page 20 indicates the form in which the claim "might have been drawn" as follows: —

> "The combination of a series of indicators, a series of keys for moving them into exposed position, *means for temporarily holding* them in such position, and *a connection between the keys and said upholding means* for moving the latter directly from the keys for the purpose described."

If there *were* such a claim, the case would be entirely altered, and we should be brought face to face with the proposition that such a claim was not patentable to Ritty and Birch; — *but the patentee made no such claim*. He did claim a "supporting wing," and he did *not* claim "a connection between the keys and said upholding means." Complainant, as we have said in our brief, is seeking to reissue the patent.

At a later period of their brief (pp. 57, 64) complainant represents Judge Colt's decision as reading into the claim many elements which are not expressly there; but a limited interpretation of the claim is perfectly consistent with, and indeed is required by, the whole language of the patent, whereas complainant's version reads out one element of the claim (the supporting wing) and reads in something not claimed, and annihilates the result set forth in the claim.

2. Complainant devotes a considerable portion of its brief (pp. 73–93) to contradicting the only description in the specification of the mode of operation of the wing-moving mechanism, which is stated to "aid" the detent of the rod in pushing back the wing. This matter is treated in our brief (pp. 13–15).

Complainant suggests (pp. 85, 86) that the invention might as well be limited to any other detail of description; but the plain answer is that this portion of the specification, which complainant is at such pains to erase from the patent, is not a description of some detail of construction, but is the *only* description of the mode of operation of the devices here in controversy.

Complainant says (p. 86) that defendants have "hung" their case on this portion of the patent. This is obviously erroneous, as both our brief and testimony show.

3. Complainant takes the position that (p. 22) "the prior art rests upon paper," and then states (pp. 68–70) that the prior devices were not fitted for practical use; and in a somewhat rhetorical conclusion (pp. 101–102) that the Ritty and Birch invention led from "the old and worthless mechanisms" to a successful cash register. *Such statements find no support in the record.* We have pointed out in our brief (pp. 32–41) that the Pottin and Campbell patents show operative machines, as complainant's own witnesses admit; and we pointed out (pp. 88–89) that even the biased testimony of Mr. Patterson, complainant's vice-president, was not that there were defects in prior machines which the Ritty and Birch invention overcame, but that there was a prejudice against such "detective" machines, which complainant overcame by advertising. In short, these statements as to the failure of prior machines are entirely unsupported by the record, and are made only to produce an illusion as to the importance of the supposed Ritty and Birch invention.

Complainant claims in conclusion (p. 102) that "a great industry has been built up on this invention," and the brief speaks of the machine manufactured by complainant as the "Ritty and Birch machine." But Mr. Patterson testified (Cross-Ints. 25–29, p. 94) that complainant's machine is called "The National Cash Register," and *not* "The Ritty and Birch Machine;" that there are other inventions and improvements embodied in the National machine; and that complainant then owned thirty-eight different patents on cash-registering mechanism. We have pointed out in our brief (pp. 88, 89) that he does *not* testify that it was the Ritty and Birch invention that made the machine a success; and there is no direct evidence that it even played an important part in that success,—the fact being, as stated by Mr. Patterson, that complainant's enterprise and advertising skill played a most important part in the introduction of the machine.

4. Embarrassed by the presence of "a supporting wing," as an element of the claim in issue, complainant endeavors to show that an oscillating wing and a sliding bar were "known substitutes" by reference to the Russell patent (pp. 23, 49). It is immaterial whether they were known substitutes or not, because both the state of the art and the language of the patent limit the claim to the supporting wing. But, furthermore, the Russell patent is an old, imperfect patent of 1829, for "Improvement in Bell Hanging," which shows no tablet rods or other elements of the Ritty and Birch machine; and, as we have stated, although complainant put this patent in evidence (Record, p. 94), neither Mr. Renwick, who subsequently testified, nor anybody else has ever referred to it as having any bearing upon the case.

Complainant contends that the sliding bar and oscillating wing "operate in the same way," but we have shown in our brief (pp. 54–56) that this is a mistake.

5. Taking the claim as misinterpreted by complainant, complainant asserts that it will cover the combination of "*any form of connecting mechanism*" with *any form of supporting bar* and keys, rods and tablets. (See pp. 40, 52.)

Complainant admits (p. 41 and elsewhere) that similar "connecting mechanisms" were old; but absolutely fails to meet our position (Brief, pp. 75–82) which we advanced with equal strenuousness in the court below, that such an "*aggregation*" of old elements, each working in its old way, could not have been patented to Ritty and Birch, if they had sought to patent it, and showed no trace of invention.

6. Complainant endeavors to find "a new result" of the alleged combination in the fact that when two rods have been raised, the subsequent actuation of only one of the same keys will drop the other rod (pp. 16, 19, and elsewhere); and it is claimed that without "connecting mechanism" this could not be done, and that a machine would therefore be "worthless" without such mechanism (pp. 22, 34). We have covered this subject fully in our brief (pp. 82–88), and need only say here that such claim of a "new result" *not only is utterly unsupported by the record, but is contradicted by complainant's own testimony;* and further, that such a result was not new, is not of any importance, and can be just as well effected without "a single connecting mechanism."

The frivolity of the whole contention is manifest from the fact that the Ritty and Birch patent does not indicate from one end to the other that it intends that two keys shall ever be depressed simultaneously, and that, moreover, the rare conjuncture suggested by complainant, namely, that two successive sales should be made for the same amount, — say one dollar and ten cents, — is obviously a very slender foundation on which to base the difference between a "practical" and "impracticable" machine.

IV.

The foregoing are fundamental errors. Minor errors are as follows: —

On p. 38, it is stated of defendants' machine without "connecting mechanism," that if the one dollar tablet should be up and the next sale should be one dollar and ten cents, the ten-cent key only need be depressed, and both tablets would remain up. This is not true either of defendants' machine without "connecting mechanism," or of the Pottin machine or any other machine in the prior art.

It is stated (pp. 30, 31) that defendants' position is that if a "severe blow" is given to one of the keys in the Campbell machine, a tablet belonging to another key will drop. This is not our contention at all. The contention is that if the key of the Campbell machine is moved through its full stroke, it will release any previously raised tablet. This, as we have stated in our brief (pp. 38, 39), is proved by the Record, and it is the operation described in the patent. If two tablets have been raised, as complainant supposes, and then only one key is actuated, unless that key is moved through its full stroke the other tablet will not be dropped; *but this is equally true of the Ritty and Birch machine*, although, of course, to a less extent. In both machines alike, the key should be moved through its full stroke to release the previously raised tablet; and in all machines now put on the market there is a rack bar on each key which compels such full operation.

It is stated (p. 63) that defendants argued before Judge Colt, that *Winans* vs. *Denmead* was, "if not obsolete, at least of doubtful authority." No such contention is found in our brief, or reported argument; and as ~~plaintiff's~~ defendants' counsel have always recognized the authority of that case, complainant's recollection is at fault.

Complainant's brief (pp. 44–73) is concerned with minute

verbal criticisms of Judge Colt's opinion, which it distorts in various particulars. We believe that our brief shows that Judge Colt's reasoning was correct in every essential; but there is no need of going into this controversy over details, for obviously, the only question before this Court is, whether upon the record, the *result* reached by Judge Colt, namely, that the bill must be dismissed, was correct. His reasoning is not material.

M'Clung vs. *Silliman*, 6 Wheaton, 598,603.
Davis vs. *Packard*, 6 Peters, 41, 48.

Complainant takes the extraordinary position (p. 41), that any kind of "connecting mechanism" infringes the patent in suit, because in later patents granted to the complainant company as assignee (Record on pages 176 and 184) different forms of "connecting mechanism" were used. These patents were not applied for until November 16, 1887, while this suit was begun on June 18, 1887 (Rec., p. 1). It is a novel legal principle that a complainant can enlarge the scope of his patent by proceeding to take out subsequent patents covering different forms of mechanism, especially when those patents are taken out after suit has been begun against an alleged infringer.

Equally surprising is complainant's contention (p. 76) that because in the machines made by the complainant company the mode of operation described in the Ritty and Birch patent was departed from, therefore the mode of operation was not made essential by the patent. This also would be a very convenient doctrine for owners of patents, but it has no authority in its support.

V.

With complainant's authorities we have no quarrel.

In the cases cited on pp. 54 and 55 of complainant's brief, the defendants had every element specified in the claims in issue, which embraced all that was essential to the invention. The cases cited on pp. 68 to 73 are those in which, as complainant says, this Court has liberally construed patents for improvements "whenever the improvement involved a broad invention."

Three of these cases we have discussed in our brief (pp. 48, 49), in pointing out the distinction between a "primary invention" and "a mere improvement upon a prior machine."

Complainant stakes its case for a broad construction of the Ritty and Birch patent upon the statements found in this portion of its brief (pp. 68–70), that all the prior patented devices were failures, and that the Ritty and Birch invention was the first practical machine. Its authorities apply only to this state of facts, and no such state of facts exists in this case. (Even if such facts should here exist, this Court would not violate the clear language of the patent, and make it cover a supposed invention which is neither described nor claimed.)

It is useless to cite at length the numerous decisions of this Court to the effect that where "the advance towards the thing desired is gradual and proceeds step by step," a patent for an improvement cannot be construed to cover different forms of mechanical construction.

Railway Co. v. *Sayles*, 97 U. S. 554, 556.
Duff v. *Sterling Pump Co.*, 107 U. S. 636, 639.
Dryfoos v. *Wiese*, 124 U. S. 32, 37.
Electric Gas Lighting Co. v. *Boston Electric Co.*, 139 U. S. 481, 492.
Miller v. *Eagle Mfg. Co.*, 151 U. S. 186, 207.

Complainant's brief (p. 93) declines to attempt to discuss the "endless number of cases for and against liberal construction of patent claims." In this it seems to us that they have acted wisely.

Complainant states (p. 58) that "the presence of a narrowly stated claim requires a broader construction of a more broadly stated claim," and cites some Circuit Court decisions, and one decision in 14 Howard. Without reviewing these decisions, it is sufficient to say that this is not the law.

Fay vs. *Cordesman*, 109 U. S. 408, 420.
Weir vs. *Morden*, 125 U. S. 98, 107.

Claim 4, in any case, is wholly different from Claim 1: it is for a sub-combination of the wing and the wing-moving mechanism, which complainant calls "the connecting mechanism" (it is not so called in the specification, nor in Claim 1), without reference to the keys, tablets and tablet rods, which are elements of Claim 1.

Conclusion.

In short, the elaborate argument of complainant's brief may be reduced to four propositions, all of which are necessary to its case.

First. The invention claimed in the first claim of complainant's patent is a combination of five elements, one of which is the train of mechanism from the keys to the wing.

Second. That this supposed combination achieved a radically new result in the art.

Third. That the cash registers and indicators shown in the prior patents were impracticable machines.

Fourth. That Ritty and Birch were entitled to claim broadly the union of five old elements, each operating in its old manner.

From these four premises is deduced the conclusion that

the patent should cover the use of *any* form of "connecting mechanism" with *any* form of supporting device in a cash register. If any one of the premises fails, the conclusion fails.

The first premise is a misinterpretation of the patent.

The second and third premises find no support in the record and are contradicted by complainant's own witnesses.

The fourth premise is an error of law.

Upon this statement, we submit a case in which the arguments have already been prolonged far beyond what the necessities of the case seem to require.

FREDERICK P. FISH,
W. K. RICHARDSON,
of Counsel for Defendants.